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RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

By M. L. FERNALD

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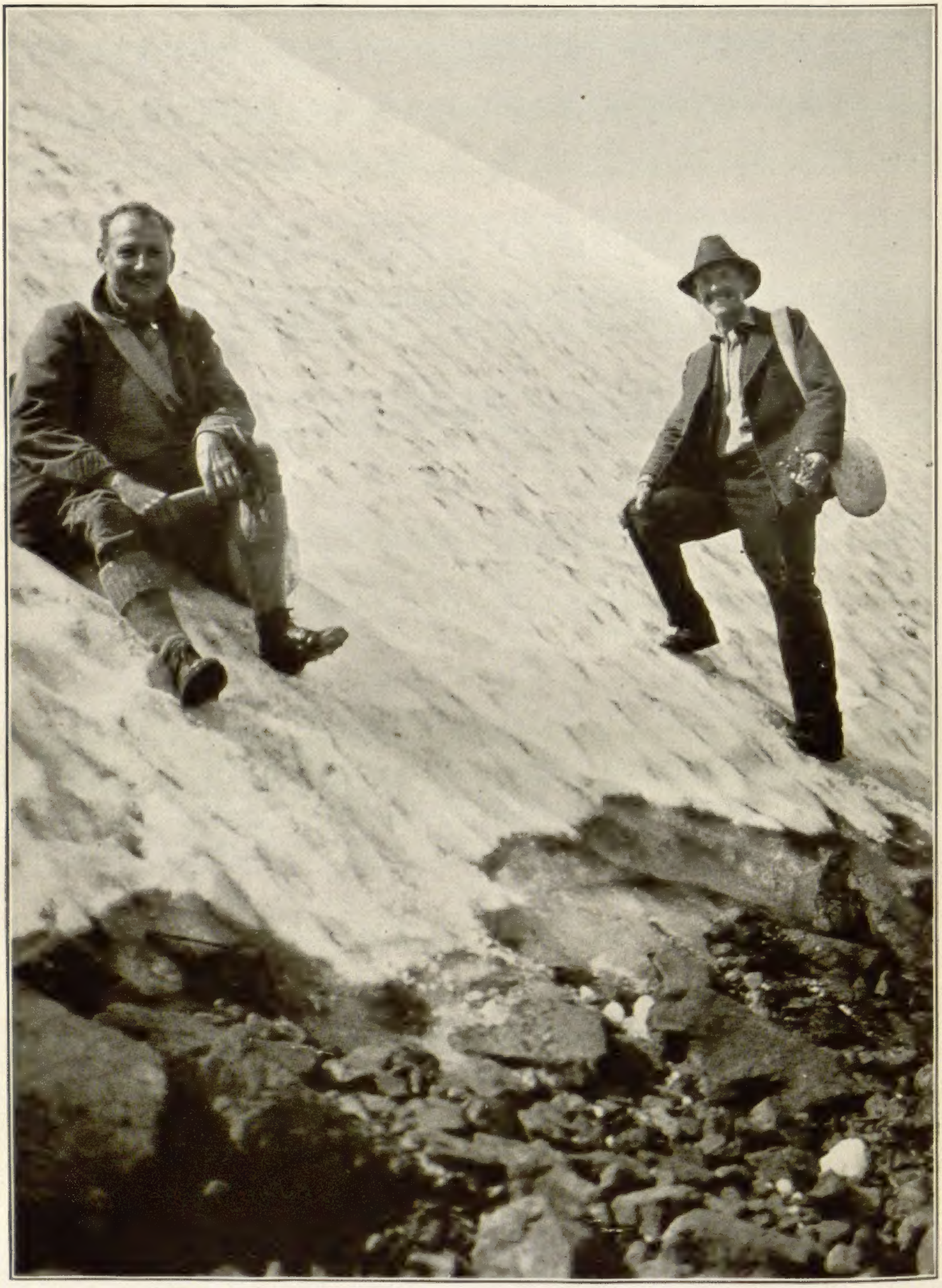

BAYARD LONG (right) and JOHN MILTON FOGG, JR. (left) on the north slope of THE TABLELAND, Bonne Bay.

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RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(Plates 232–273)[1]

Part I. Journal of 1926 and 1929

I have already published two extended accounts[2] of botanical work in Newfoundland and some other papers[3] in which the great interest and the relic endemism or isolation of plants in Newfoundland has been much emphasized. Very briefly summarized some of the many

[1] The snap-shots of topography, unless otherwise stated, are my own. The photographs of plants have been prepared, with aid from the Milton Fund for Research of Harvard University, by Dr. Hugh M. Raup or by Mr. Charles Bullard, whose unlimited kindness I wish here to acknowledge. The large cost of reproduction of the plates has been wholly met by my ever loyal companion, Mr. Bayard Long. The preparation of the maps has been possible through the Milton Fund for Research. The polar projection used in some maps is Goode's No. 201 Pc, copyrighted and published by the University of Chicago. Some plates, cited in early parts of the paper, will appear in later instalments, where more appropriate.

[2] *A Botanical Expedition to Newfoundland and Southern Labrador* (Contrib. Gray Herb. n. s. no. xl.), Rhodora xiii. 109–162, plates 86–91 (1911).

Two Summers of Botanizing in Newfoundland (Contrib. Gray Herb. lxxvi.) Rhodora xxviii. 49–63, 74–87, 89–111, 115–120, 145–155, 161–178, 181–204, 210–225, 234–241, plates 153–155 (1926, 1927).

[3] *The Contrasts in the Floras of Eastern and Western Newfoundland.* Am. Journ. Bot. v. 237–247 (1918).

Persistence of Plants in Unglaciated Areas of Boreal America (Mem. Gray Herb., no. ii.) Mem. Am. Acad. xv. no. iii. (1925).

Some Relationships of the Floras of the Northern Hemisphere. Proc. Intern. Congr. Pl. Sci. ii. 1487–1507 (1929).

Unglaciated Western Newfoundland. Harvard Alumni Bull. Jan. 23, 1930 (with photographs of characteristic topography).

Specific Segregations and Identities in some Floras of Eastern North America and the Old World (Contrib. Gray Herb. xciii.), Rhodora, xxxiii. 25–63, plate 204 (1931).

points of phytogeographic interest are: (1) the restricted areas in Newfoundland of at least the later glaciations of the Pleistocene, with the result that a large element of the flora seems to have persisted unscathed through the Pleistocene or, at any rate, through the Wisconsin (or Labradorean) glaciation; (2) the high degree of endemism in the flora of the West Coast, from Cape Ray to Cape Norman; (3) the identity or close affinity of much of the flora of western Newfoundland with that of the Arctic Archipelago and arctic Eurasia and, in some cases, with that of the Cordilleran and Pacific regions of North America; (4) the representation of a number of groups now found mostly in the Southern Hemisphere and the Tropics, but also sharing Newfoundland with Nova Scotia and the Coastal Plain of the eastern United States, a flora apparently of Cretaceous origin which had its interchanges along the now submerged Cretaceous and Tertiary continental shelf; (5) the occurrence, especially on the Avalon Peninsula, of a considerable Atlantic European element unknown elsewhere in eastern America; (6) these isolated or relic elements and the endemic species occurring mostly as localized and often very restricted colonies in the widely diffused and everywhere common and comparatively uninteresting elements of the Canadian and Hudsonian forests, bogs, shores and barrens.

To the field-botanist with temperamental ability to take things as they come, to work under disadvantageous conditions, to overlook the discomforts of perpetually fighting swarms of black-flies and mosquitoes and to maintain a cheerful enthusiasm in spite of frequent deficiencies of diet and the regular failure of the announced schedules of boats to meet their obligations, western Newfoundland still offers almost virgin and unspoiled territory for fascinating exploration and important botanical discovery. The last general account of the work of parties of which I had the good fortune to be a member covered the summers of 1924 and 1925. The summer of 1926 was largely taken up for botanists of eastern America by the International Congress at Ithaca; but, having a short period of early autumn still available, my ever-ready companion, Mr. Bayard Long, and my genial student, now Dr. John Milton Fogg, joined me after the Ithaca meetings and we went, via Montreal, on one of the sumptuous steamships of the Clarke line to Corner Brook at the head ("bottom") of the Bay of Islands, with the avowed purpose of locating at Lark Harbor, at the southern entrance to the Bay of Islands, thence, when the weather

proved propitious, to go by motor boat southward along the outer cliff-wall to Serpentine River whence we could make a simple approach to the unbotanized Lewis Hills, the highest mountains (2700 ft.) of Newfoundland. We planned to finish the trip by proceeding slightly east of Cape Ray to the region of Burgeo in order to get some idea of the flora of a thoroughly glaciated granitic area, to contrast with the flora of the unglaciated or, at least, recently unglaciated West Coast.

Entering Bay of Islands, we longed immediately to get at the sheer outer wall of trap rock which, broken only by tiny coves, extends far south, to Bluff Head. Passing Lark Harbor and steaming to the head of Humber Arm, we were there met by a motor boat sent in by our prospective host, Mr. Moses G. Sheppard, proprietor of the extensive fisheries at Lark Harbor; and toward mid-afternoon we started back about thirty miles over the steamship's route, to Lark Harbor. The afternoon was windy, with black clouds overhanging the precipitous (nearly 2000 feet high) walls of Blomidon, and, in spite of sweaters and oilskins, we fully approved the local pronunciation, "Blow-me-down." Passing the inner islands of the Bay and the outer cliffs of Blomidon in the evening light, we gazed in awe at the mountain-walls and, reaching Lark Harbor, were greeted from the wharf with the informative: "Well, gentlemen, dis is w'ot we calls de Bay of Hilands." Either way we thought of it the name seemed wholly appropriate, but somehow we got a feeling that we had just drifted ashore and were not supposed to know where we had landed. It was a fortunate haven, however: Mr. Sheppard, a progressive man of fine physique and sturdy character, genial, wholesome and hospitable, and busy through a long day; Mrs. Sheppard, a women of unusual poise and background, who, with at least two of the daughters, had seen much of the outside world; the twin sons and our efficient skipper, Pennell, alert and, like the others, anxious to make our botanizing successful. The Sheppards also had a fine garden of many vegetables, one of the desiderata in many Newfoundland ports, and we were inclined, as we have not always been at fishing ports, to linger over our meals.

When we awoke on the morning of August 30th, the weather was "dirty" and, in fact, for a full week we did not have a truly "civil" day. We botanized along the shore toward York Harbor, visited some of the islands, spent a day on the inner slope of Lark Mountain,

and on one bright but very windy day Long and Fogg crossed over to explore the desert-like serpentine ridge which flanks the North Arm; but at no time would the wind let up and give us the calm weather necessary if we were to follow the outer sea-wall in a small boat and make a safe entry into the Serpentine. Waghorne had botanized about Lark Harbor, Eames and Godfrey had made a center at the copper mine above York Harbor, and Mackenzie and Griscom had got at Blomidon from Frenchman's Cove; while Wiegand and I, in 1910, had twice visited Blomidon from Benoit's Cove. Consequently, lingering at Lark Harbor merely to take advantage of calm weather, we did not undertake extensive trips away from headquarters. But these short excursions into the neighboring region yielded fair returns, though, of course, Waghorne and his successors had already secured the more interesting species.

The season had been unduly cold; snow of the preceding winter lingered in early September on many slopes; the general verdict was that there had been no summer; and we heard many accounts of unmelted snow-banks extending down to the sea along the Straits of Belle Isle. The vegetation in early autumn was in the usual midsummer state; the plants which usually flower in late July or early August were just coming into bloom. The immediate neighborhood of Lark Harbor, we had been told, would be quite unspoiled and an ideal place for botanists, "absolutely wild, with lots of sheep and goats." The sheep and goats had had full control; but from among the meagre remnants of vegetation we were able to pull out a solitary *Botrychium simplex*[1] and a few other vouchers which even they had missed.

The inner slope of Lark Mountain, however, had good fences near the base and we soon got into wholly primitive mountain-woods, with *Aster acuminatus* and some other Canadian forest types which are not often seen in Newfoundland; in fact, the *Aster* had been known on the Island only from thickets at the southwest corner, Port aux Basques. Passing above timber line we were out on the open wind-swept lower edge of the tableland, but instead of being arctic-alpine as, in spite of many experiences, we still somehow expected the tablelands of western Newfoundland to be, it was in some features less "alpine" than the shores of the outer Bay. A

[1] It seems unnecessary to encumber the narrative by giving the authors of species which are in the current manuals. They will be noted only in cases of change or for species not in Gray's Manual.

few "arctic-alpine" species of broad range and of general occurrence in almost any bleak or open habitat in Newfoundland were there: the inevitable *Lycopodium Selago* and *L. annotinum* var. *pungens*, *Juniperus communis* var. *montana*, *Agrostis borealis*, *Hierochloe alpina*, *Scirpus cespitosus* var. *callosus* Bigel., *Carex rariflora*, *C. scirpoidea*, *Juncus trifidus*, *Salix Uva-ursi*, *Rubus Chamaemorus*, *Viola labradorica*, *Loiseleuria procumbens*, *Arctostaphylos alpina*, *Vaccinium uliginosum* var. *alpinum* Bigel.[1] and *Diapensia lapponica*. However, these and many others, which in New England we call "arctic-alpine," are so nearly ubiquitous at all altitudes in Newfoundland that they were mostly on our "taboo-list," not to be collected unless an extraordinarily fine or exceptional specimen was found. Consequently, they failed to stir our emotions.

Far more interesting on the tableland were their more southern companions, a group of species characteristic of acid peats of New Jersey, southern New York, southern New England or Nova Scotia, here thriving, as they do on the great diorite tableland of Blomidon to the east, as well as on the high barrens of the interior, in the region of The Topsails (from Kitty's Brook and Gafftopsail east at least to the Millertown region), and in the peats at sea-level in southern Newfoundland. High up above the timber the more continuous mossy carpets were as suggestive of the New Jersey Pine Barrens as they were of the North: the flesh-pink to crimson *Aster nemoralis* and the slender *Solidago uniligulata* everywhere, with such of their regular Pine Barren associates as *Agrostis scabra* Willd., *Muhlenbergia uniflora* (Muhl.) Fern. (var. *terrae-novae* Fern.[2]), *Eriophorum tenellum* and *virginicum*, *Rynchospora fusca* and *alba*, *Carex exilis*, *trisperma* var. *Billingsii* and *livida* var. *Grayana* (Dewey) Fern.[3], *Juncus canadensis* (var. *sparsiflorus* Fern.[4]), *Habenaria clavellata* and *blephariglottis*, *Pogonia ophioglossoides*, *Calopogon pulchellus* (scarce), *Arethusa bulbosa*, *Sarracenia purpurea* and *Utricularia cornuta*. Shallow pools were filled with *Nymphozanthus variegatus* (Engelm.) Fern.,[5] *Eriocaulon septangulare* and *Potamogeton Oakesianus;* and at the margins of pools or on seepy slopes in the peat the austral *Juncus pelocarpus* abounded, with the austral genus *Xyris* represented by *X. montana* and the austral *Bartonia paniculata* by the endemic

[1] See Rhodora, xxv. 24 (1923).
[2] Rhodora, xxix. 11 (1927).
[3] Rhodora, xxviii. 8 (1926).
[4] Rhodora, xxiii. 241 (1921).
[5] Rhodora, xxi. 187 (1919).

var. *iodandra* (Rob.) Fern.,[1] while the famous Pine Barren specialty, *Schizaea pusilla* (MAP 7), nestled among the *Bartonia* and Rynchosporas.

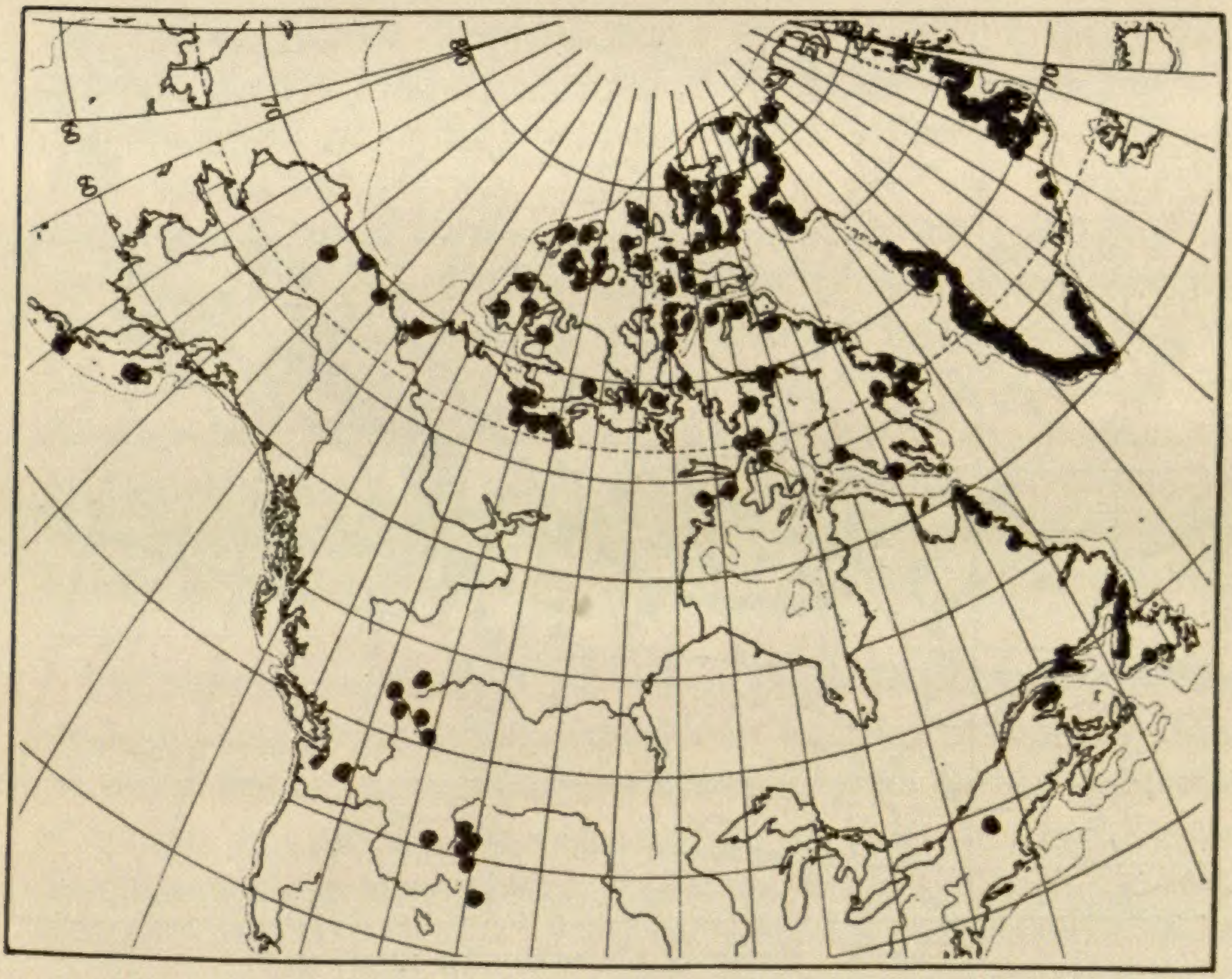
Although a novel experience for Fogg, this was an old story to Long and me; in fact, as far back as 1910 Wiegand and I had first met[2] this wholly unexpected mingling of austral and circumpolar species on the top of Newfoundland (at 2000 feet altitude) on the broad diorite tableland of Blomidon; in 1911 Bartram and I encountered it in the Quarry and Maintopsail region and Wiegand and I had an experience with it on the Avalon Peninsula; and in 1924 Long, Dunbar and I had repeated the list, with a few additional species, on the Long Range back of Port aux Basques.[3] But the dominance of this austral flora on the high tablelands of Newfoundland has not yet lost its thrill and we are repeatedly tempted to ascend new blocks of the great dissected tableland (the uplifted Cretaceous Peneplane)[4] of western Newfoundland to rediscover this amazing "alpine" flora, which to the south and east on the Island comes down to sea-level.

September 1st on Lark Mountain saw the beginning of a hectic fortnight with *Euphrasia*. In ordinary summers *Euphrasia* in Newfoundland is fully flowering in late July and early August, but the "summerless" season of 1926 was so backward that in early September the species were in the prime of flowering. In the subalpine gravels of Lark Mountain the species was *E. Williamsii* (the Newfoundland var. *vestita* Fern. & Wieg.), the dwarf species of the alpine area of the White Mountains with chocolate-purple corollas, known in its typical glabrous form also from the Shickshock Mts. of Gaspé and from headlands along the Straits of Belle Isle, and in the pubescent var. *vestita* on alpine slopes and exposed crests of western and northern Newfoundland and adjacent Quebec Labrador.

We wanted to explore the bare montane islands at the entrance to the Bay of Islands. The strong winds, however, made landing on the highest of the outermost and, consequently, the most inviting (Weebald or Guernsey, 1053 feet high), impossible; but we suceecded in making French or Tweed Island (702 feet) and, with the greatest ease, the inner and sheltered low islands (Wood's, Woody, Seal's

[1] RHODORA, xxiii. 288 (1922).
[2] RHODORA, xiii. 133 (1911).
[3] RHODORA, xxviii. 56 (1926).
[4] RHODORA, xxxiii. 37 (1931); characteristic portions of the Newfoundland tableland are shown in RHODORA, xiii. t. 87 and xxviii. t. 154.

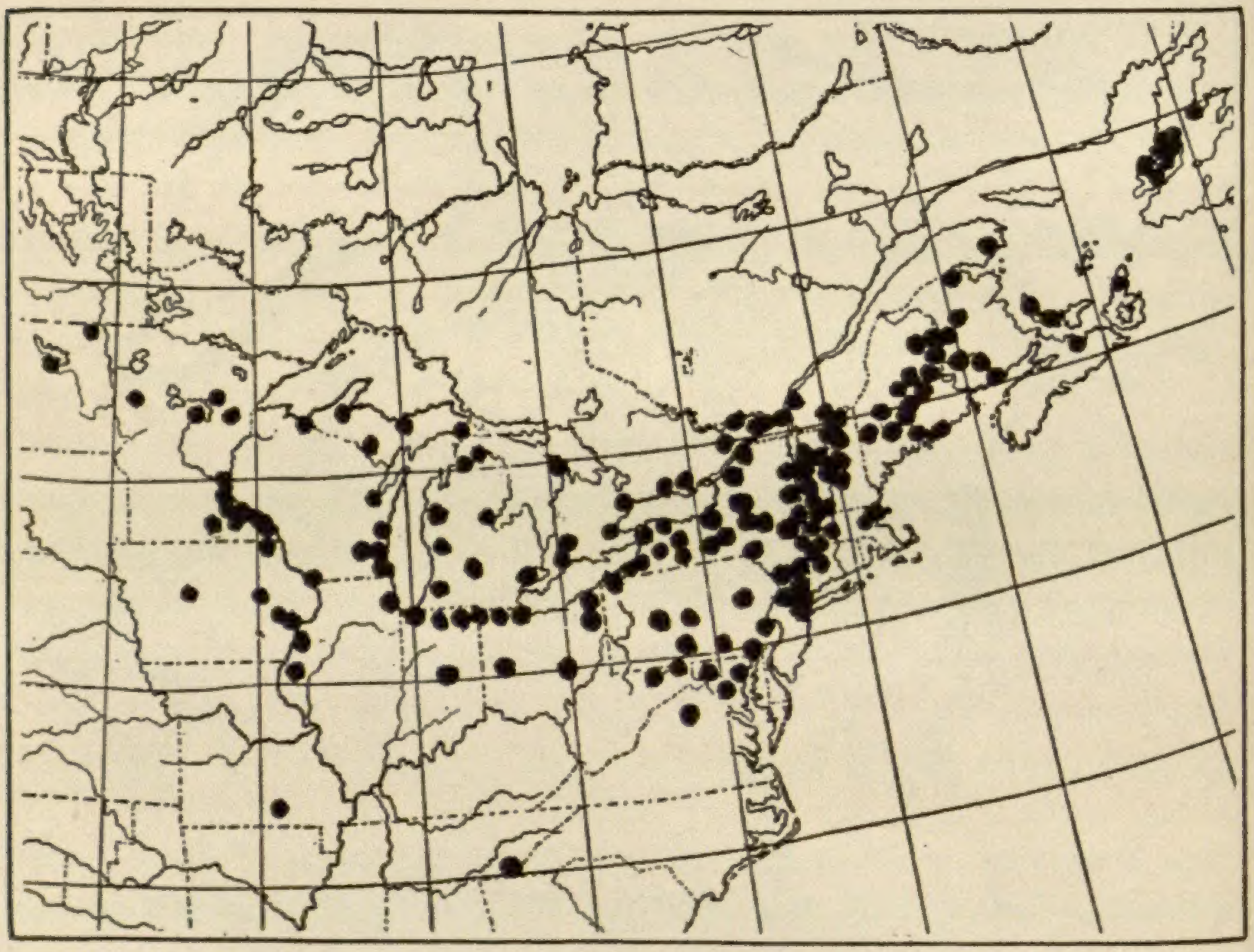
Nest and Governor). As just implied, sea-level on the outer coast is often more "alpine" than the summit-tablelands. Consequently, it was gratifying but not at all surprising to find the ledges (trap) and lower gravelly slopes of French Island carpeted by many species which occur north to latitudes 74°–85° in Greenland or Ellesmereland and which, in latitude 49°, we should expect to find only on the highest mountains: such species as *Festuca vivipara* (L.) Sm., *Luzula spicata*, *Silene acaulis* var. *exscapa* (All.) DC. (coming south from lat. 83°), *Draba rupestris* R. Br., and *Saxifraga aizoides* and *S. oppositifolia*



Map 1. American Range of SAXIFRAGA OPPOSITIFOLIA.

(extending south from lat. 85°, MAP 1). The arctic and subarctic *Artemisia borealis* Pall. was here, but with extraordinarily coarse leaf-segments, var. *latisecta* Fern., RHODORA, xxix. 93 (1927); and *Euphrasia* added its quota of puzzles. The endemic goldenrod of western Newfoundland, *Solidago hispida* var. *arnoglossa* Fern., RHODORA, xvii. 2 (1915), characterized by its very large narrowly obovate cauline leaves, was here well developed and so unlike the common small-leaved typical form of the species that in its extreme

development it seems very definite. Transitional material in abundance, however, found both here and in a subsequent year near Bonne Bay, constrains us to maintain it as a geographic variety rather than as a species. Another goldenrod of French Island which greatly perplexed us has the foliage of *Solidago rugosa* but the panicles so condensed that in the smallest specimens they form dense ovoid inflorescences scarcely 2 cm. in diameter. The plant seems to be *S. rugosa* "reduced to its lowest terms," so to speak, at this bleak northern limit of the species.



Map 2. Range of CYPRIPEDIUM REGINAE.

Other southern species on French Island which seemed absolutely out of place in close proximity to *Silene acaulis* and *Saxifraga oppositifolia* (MAP 1) were *Cypripedium reginae* Walt. (MAP 2) and *Habenaria orbiculata* (MAP 9). The Showy Lady's Slipper had found a protecting thicket by a stream; but *Habenaria orbiculata* was so abundant as to be almost dominant in dry peat and gravel within a stone's throw of the open shore. In New England and eastern Canada we had always thought of it as an orchid of the richest of old woodlands; but its choice of habitat on bleak French Island was only a breaking

of the ice for our next station for it. In 1929 we found it vying with the arctic *Scirpus cespitosus* var. *callosus* (MAP 10) for possession of a sphagnous pocket on the high tableland of Lookout Mountain at Bonne Bay. Yet some critics complain that habitats are not correctly stated in our manuals! If we only could have got a day on Weebald Island, who can say what transgressions we might have found?

The inner and lower islands were less dramatic. Woody Island has some good sandstone ledges along shore; but Wood's Island, inhabited and severely burned, is botanically hopeless, and the other two visited were so slightly explored by us that we found nothing specially notable. The halophytic flora on the sandstone cliffs of Woody Island is particularly fine: all the ordinary halophytes of this region, with various doubtful Chenopods and Polygonums; *Euphrasia purpurea* Reeks amazingly fleshy or succulent; *Cochlearia cyclocarpa* Blake,[1] a biennial, with rosettes of rounded succulent leaves, tasting like a blend of water-cress and horseradish; and the broad-leaved *Plantago juncoides* var. *laurentiana* Fern.[2] in typical development. *Cornus suecica*, frequent enough along the coast and on the mountains, was here particularly beautiful; and the higher rocks supported good colonies of *Potentilla pectinata* Raf., a species known in Newfoundland from only a few stations, all on the West Coast.

The north-facing wall of the eastern serpentine half of Blomidon drips in many places with moisture from the packed snow and ice of its upper slopes; consequently its flora,[3] although limited in number of species, is a rich one for serpentine country (silicate of magnesium, therefore toxic to most plants); and, since the high ridge on the north side of North Arm is also serpentine, and very conspicuous from incoming and out-going boats, we had great hopes of some good things there. So, as a last trip, on a cold and windy day, Long and Fogg, with Pennell and one of the Sheppard boys, crossed in a motor boat to the North Arm. In our optimism we had overlooked one important point: the cold north side of Blomidon faces north and is bathed by melting snows through much of the summer; the hot serpentine slope north of the North Arm faces south and is arid and almost without vegetation. To Long and Fogg the arduous climb over

[1] Blake, RHODORA, xvi. 135 (1914).
[2] RHODORA, xxvii. 102, t. 150, fig. 5 (1925).
[3] See Fernald, RHODORA, xiii. 118, 132 (1911).

arid blocks of serpentine seemed to have few rewards, for nowhere did they find continuous carpets of vegetation, merely scattered plants of a few inconspicuous species. Nevertheless, they got several of the most localized and interesting species of the serpentines of western Newfoundland and thus added an intermediate station for them between Blomidon at the south and The Tableland of Bonne Bay at the north. *Adiantum pedatum* var. *aleuticum* Rupr. was there, of course, as on all the extensive serpentine areas of Newfoundland and Quebec, on the North Arm the most stiffly erect extreme. *Rhododendron lapponicum* was characteristic. In Newfoundland and Gaspé it grows profusely on serpentine barrens as well as on dry limestones; but in neither region have we ever found it on granite or quartzite, although further south, on Katahdin and on Washington, it is on reputedly granitic rock and it seems to be common on the granites and gneisses of Labrador. The failure in the best Rhododendron gardens to make *R. lapponicum* thrive might, perhaps, be averted by giving it a bed of broken serpentine or of magnesian limestone, rather than the usual peat and sand of conventional Rhododendron gardens.

Danthonia intermedia and *Conioselinum pumilum* Rose, in Newfoundland known only on serpentine, were brought back; and Long and Fogg had the two prostrate willows, already known from Blomidon, *Salix cordifolia* var. *Macounii* (Rydb.) Schneider and *S. anglorum* var. *kophophylla* Schneider. The junior member of the party, facetiously inclined to translate the technical names into the so-called "English names" of some of our handbooks, rendered the last "The Cough-loving Willow of the Angles" and suggested that we each carry a bit as a charm against colds. Three of the distinctive Caryophylls of Newfoundland or of Newfoundland and Gaspé were there, as on all the serpentine mountains yet explored in western Newfoundland: *Arenaria marcescens* Fern.,[1] *A. cylindrocarpa* Fern.[2] and *Cerastium terrae-novae* Fern. & Wieg.[3] All three are so interesting and so highly localized that it seems desirable to publish good illustrations of them. *Arenaria marcescens* (PLATE 255) forms broad mats on the driest of serpentine gravel in the Long Range of Newfoundland and on the great tableland of Mt. Albert in Gaspé. Related to various arctic and subarctic species (especially *A. laricifolia* L.

[1] RHODORA, xxi. 15 (1919).
[2] RHODORA, xvi. 43 (1914).
[3] Fern. & Wieg. RHODORA, xxii. 176 (1920).

and *A. arctica* Stev.), *A. marcescens* is nearer related to *A. obtusiloba* (Rydb.) Fern. (*Alsinopsis obtusiloba* Rydb.) of the Rocky Mountains.

Arenaria cylindrocarpa was long confused with the European *A. ciliata* L. and *A. norvegica* Gunn. (*A. ciliata* var. *norvegica* (Gunn.) Hartm., *A. ciliata* var. *humifusa* Hartm.). Several characters separate *A. cylindrocarpa* from both European species but Ostenfeld and some other European students have maintained that it is not specifically separable. Small but characteristic specimens of *A. cylindrocarpa* and of *A. norvegica* (*A. ciliata*, with strongly ciliate leaves, is more remote) are, therefore, shown (PLATE 256) with sufficient details to make their distinctness evident.

Cerastium terrae-novae (PLATE 257), known only from the western Newfoundland serpentines, is geographically very remote from its close relatives. In its large seeds it is somewhat like *C. Earlei* Rydb. of the Rocky Mts., but in the loose testa of the seed (very fragile and freely breaking away) it is nearer the European *C. latifolium* L. For purposes of illustration a very small plant has been selected; when well developed, *C. terrae-novae* may form fuscous-green or purplish mats up to 3 or 4 dm. across.

On this hopelessly barren ridge by the North Arm *Pinus Strobus* struggled against adversity, forming prostrate carpets 2 to 3 meters (6–10 feet) across and only 5–8 dm. (1½ to 2½ feet) high, but heavily loaded with cones, *P. Strobus* forma *prostrata* (Mast.) Fern. & Weatherby, RHODORA, XXXIV. 168 (1932), a far cry from the great White Pines of early New England days with trunks "seven feet eight inches in diameter" "and frequently 250 feet in height." In 1921 Mackenzie & Griscom found forma *prostrata* on Blomidon. Even the erect trees of *P. Strobus* in Newfoundland depart in some characters from the better developed trees on the continent, having very nodulose branchlets and short leaves, the latter not infrequently in 3's as well as in the conventional 5's. These modifications are apparently confined to the northeastern and rather unfavorable limits of the species.

The strong winds making it impossible to land on the outer islands or to reach Chimney Cove (Waghorne's station for *Erysimum coarctatum* Fern. and other very rare species) or Wild Cove, with "the beach . . . broken white coral" (*Nfd. and Lab. Pilot*), where Waghorne had found the North Pacific *Arenaria peploides*, var. *maxima* Fern. and the remarkable and never rediscovered *Salix*

Bebbiana, var. *projecta* (Fern.) Schneider, it was obvious that the Serpentine and the Lewis Hills were not to be reached this season. So, regretting to abandon them and to leave our hospitable home with the Sheppard family, we moved on to Port aux Basques, thence by the "Portia" to Burgeo.

Whereas Wisconsin glaciation in westernmost Newfoundland failed to denude the tablelands and often left the low forelands with their ancient blankets of deeply rotted rock, Burgeo and the region westward to the eastern base of the Long Range seems to have been scraped clean (PLATE 233). The granitic hills are quite denuded of rotted residual mantle, scratched and gouged as if heavy mattocks and picks had been used on them only yesterday, and littered with great unweathered and obviously transported boulders (PLATE 233). Here we got few of the localized endemics. The tiny *Betula Michauxii* Spach, Newfoundland and Labrador representative of the Old World *B. nana* L., but with unlobed bracts or scales, abounded, as it does in practically all acid peat on the Island; *Empetrum Eamesii* Fern. & Wieg., ROCKBERRY, with its beautiful coral-pink berries, likewise throughout the Island, was on all dry ledges, and the ubiquitous *Agrostis scabra* Willd. (*A. hyemalis* of most recent authors, not *Cornucopiae hyemalis* Walt.) was everywhere, but chiefly in the extreme with very large spikelets which occurs throughout Newfoundland (to be described in Part III). The dry peat of the granitic crests, just as at Port aux Basques and generally eastward to the Avalon Peninsula, was carpeted with *Festuca capillata* Lam., the typical European plant, here certainly indigenous. Damp mossy pockets were the home of the endemic of southern Newfoundland, *Epilobium Pylaieanum* Fern.[1] (PLATE 259), distinguished from the many forms of *E. palustre* by its very short oblong leaves, the oblong and round-tipped calyx-lobes and the unusually long beak of the seed. The original collections, from various stations from Cape Race to Cape Ray, were mostly unbranched, but at Burgeo and westward as far as we went (to the Great Barachois) it was often bushy-branched.

We spent one day between Burgeo and Sand Bank to the west, another about Great Barachois and following up Grandy Brook. In general, the flora was rather uninteresting, though the tedium was occasionally relieved by the finding of some species local on the Island:

[1] RHODORA, XXVII. 33 (1925).

Elatine minima (Nutt.) Fisch. & Meyer, either rare or generally overlooked; *Oryzopsis canadensis* (Poir.) Torr., which we had recently been collecting on Lark Mt.; *Carex hormathodes* Fern., already locally known in both western and eastern Newfoundland; and *Polygonum allocarpum* Blake,[1] for which the Newfoundland voucher had been unsatisfactory. The always surprising *Schizaea*, *Bartonia* and *Xyris* were there, as probably everywhere in southern Newfoundland; but when we finally had to leave for home we felt that we had done our duty by the severely glaciated granitic coast and that the next botanizing trip could rightfully be confined to the always repaying West Coast.

Planning for the next trip, in the summer of 1929, we laid out a very beautiful schedule which we hoped to carry through with aid I had received from the Milton Fund for Research at Harvard. Our optimistic programme closely followed, with amazing and unreasoning credulity, the announced sailings of the local steamers, especially the "Sagona," plying weekly (leaving Humbermouth on Wednesdays) between Bay of Islands and Battle Harbor (Labrador). We were to begin with a day or two at Old Port au Choix, near where Bachelot de la Pylaie, more than a century ago, had spent eight days, and close to Pointe Riche which Wiegand had visited in 1910; consequently, worked out. Wiegand, however, got a foliage-specimen of a very strange willow which Schneider and I had independently considered an undescribed species, but good material was needed. A day or two at Old Port au Choix would suffice; then a trip over to St. John's Island would give an opportunity to secure better material of a "red-seeded" *Taraxacum*, secured over-ripe in 1925. Then Trout River was in the schedule, with its spectacular mountains, and a long trip to the Lewis Hills, to be reached via Port au Port.

The railroad did its part and we kept up to schedule as far as Bay of Islands; but from the day of our arrival to the day of final sailing toward home in September the announced schedule remained abashed in the depth of a pocket-book and the only date actually kept was that of Fogg's departure some days before Long and I were ready to leave.

Reaching the Bay of Islands by train, exactly on schedule, near noon of Wednesday, July 10th, with abundant time to make the "Sagona" at 5 p. m., we learned, to our dismay, that, true to form, she was off

[1] Blake, Rhodora, xix. 234 (1917).

schedule. She had sailed late on the last trip north and "Heaven knew when she would be back." At last account she was taking on halibut on "the Labrador" and this was slow work, each dripping and slippery box weighing 200 lbs. and the contract calling for 1600 boxes to be aboard before she could start south! One commerical salesman of great experience advised us: "Next time wire to Battle Harbor and learn when she will sail south from there. When she has started south, you leave New York for Humbermouth and you will make her all right." No one knew when the "Sagona" would come in nor would they know until she had reached Rocky Harbor at Bonne Bay, only a few hours away. We were living at Davis's at Curling, our trunks and duffle bags were all at the steamship's terminal some miles away, at Humbermouth; but, by making several trips to the latter hotel-less point, we gradually lugged away much of our collecting material and settled down to work in the loft of the steamship company's wharf at Curling, where the agent, Mr. Frank Roach, did everything possible to facilitate our work and to keep us from regretting the loss of valuable time. It was actually a full week before the "Sagona" came in with her heavy cargo of once iced halibut, to be re-iced at Curling, shipped to North Sydney and there re-iced, thence going by train to Boston, New York, Buffalo and Detroit to supply the markets with "fresh" halibut. But our wait was a comparatively short one; a few miles away, as unconscious of our presence in the neighborhood as we of theirs, Mr. and Mrs. Frank Morris, the "Orchid enthusiasts," were spending 10 days at desolate "boom-town" Corner Brook, also awaiting the "Sagona!"

We were in perplexity. The shores of Bay of Islands had been "worked to death" and we dared not go beyond easy reach of the evasive "Sagona." The first afternoon we strolled, by way of much-botanized Mt. Moriah, along the railroad as far as Morley's Pond. The latter area had never been much visited; consequently, we were able to secure two species not previously known in the region: *Equisetum pratense*, abundant in the thicket, the first Newfoundland station south of St. John Bay; and *Potamogeton praelongus*, the abundant winter-buds of the preceding season swashing at the margin of the pond. We had gone especially to secure good material of *Najas flexilis*, seen by Wiegand and me in or near Morley's Pond in 1910, before our collecting equipment of that year had arrived, and left to be collected later. The wind was too strong for us to see it in

1929 and the vouchers still await collection. The springy thickets near the base of Mt. Moriah were white with "Mayflower," *Cardamine pratensis* var. *palustris* Wimm. & Grab., another addition to our list from Bay of Islands; and, in the pastured clearings about Curling and eastward to Crow's Gulch, the English Daisy, *Bellis perennis*, was an abundant weed, a plant frequent enough in gardens but never before in our experience a truly naturalized plant.

Looking from various points on Humber Arm one sees a conspicuous white hill a few miles up the Humber on the north side. I had often viewed it from a distance and had always mentally dismissed it as a badly burned granite or quartzite hill of no botanical interest. But, in desperation for something to occupy us, we decided to go there, for, at any rate, it would be wild and some miles from civilization, surely better than over-botanized Curling and shabby and hustling Corner Brook. So on July 12, Mr. Roach assuring us that the "Sagona" would not be in, he took us by motor boat up river to our hill, Hannah's Head according to established local nomenclature, but Mt. Patricia on modern English-made maps, imposing and rising perhaps 1200 feet above the river, one of the striking features of the famous Humber Gorge.

Landing on the wooded ledges, we at once saw the typical calciphiles of the region; Hannah's Head was limestone and sure to be interesting! The wooded glades were, of course, full of the ordinary plants of limy spruce woods; but, mingled with them here or in the springy openings on the opposite bank of the Humber (between Marble Mt. and Humbermouth), which we visited on two other days, and appearing quite native, were five European plants, two of which, in 1910, Wiegand and I had supposed to be introduced weeds. On the lower Humber, however, they are not aggressive and weedlike but occur with the strictly American and conservative plants of springy glades or openings; nor do they follow the railroad and mingle with the abundant introduced weeds a few miles away in the freight-yards of Humbermouth and Corner Brook. *Linum catharticum* abounds on the open springy banks and runs far up the slope of Hannah's Head in the limestone crevices; *Lathyrus pratensis*, superb in its woodland setting, with rich yellow flowers, extends high up a springy slope opposite Hannah's Head; *Cirsium palustre*, tall and unmistakable, with deep crimson-purple heads in dense glomerules, shares the swamps with the endemic American *C. muticum*.

Springy banks and margins of rills coming down the steep slopes on the south side of the river are bordered by a *Cardamine*, differing at once from the ubiquitous *C. pensylvanica* in its petiolulate rounded leaflets: *C. flexuosa* With., a beatiful European species new to North America. Along the river at the foot of Hannah's Head, on the ledges where we landed, the European *Scrophularia nodosa* L. grew from the crevices and, higher up, above the wooded base of the hill, it grew in many rock-crevices. This was good enough!

(*To be continued*)

Denuded granitic Crest back of Burgeo (upper); Transported Boulders on Crest near Grandy Brook (lower).

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 16*)

But when we got above the timber, on the exposed limestone slope, the most amazing sight of all greeted us, solid carpets covering acres of slope, like a lawn, with three dominant plants: *Botrychium Lunaria* by thousands, growing 20 to 30 to a turf 2 decimeters across, the plants 1.5–2.5 dm. high, with sterile fronds up to 1 dm. long, so abundant that it was impossible to step without crushing the fronds; *Anemone multifida*, a local plant in Newfoundland or anywhere else, the larger clumps with 10 to 60 peduncles bearing rosy-pink flowers or whitish cottony heads of fruit; and *Festuca brachyphylla* Schult., frequent enough in western Newfoundland but not often in such abundance. Of course there were other things, the usual calciphiles of western Newfoundland: *Asplenium viride* Huds. (unless we are to take up for it the earlier *A. Trichomanes-ramosum* L.[1]), *Woodsia glabella*, *Cryptogramma Stelleri* forming turf, *Thelypteris Robertiana* (Hoffm.) Slosson, *Polystichum Lonchitis*, *Anemone parviflora*, *Are-*

[1] This species has been universally known as *Asplenium viride* Hudson (1762). Nevertheless, the plant had an earlier and properly published name in *A. Trichomanes-ramosum* L. Sp. Pl. ii. 1082 (1753). The Linnean species drew its compound specific epithet from *Trichomanes ramosum* of Bauhin and of Ray and it was treated by Linnaeus as a species, *A. Trichomanes-ramosum*, in all three editions of *Species Plantarum*, a species wholly apart from *A. Trichomanes* L. (1753). When Hudson published *A. viride* (as *A. viridi*) he, likewise, cited as synonyms *Trichomanes ramosum* of Bauhin and of Ray. The Linnean name was promptly thrown aside in favor of Hudson's *A. viride*, apparently because the name given by Linnaeus might suggest to the uninformed that a forking state or perhaps a hybrid of *A. Trichomanes* L. was intended; and the name *A. Trichomanes-ramosum* even disappeared from the synonymy. Christensen, however, in *Index Filicum*, correctly cites it as a synonym of *A. viride* and suggests that it is the best name; but he refrains from following priority in this case and retains the later and more familiar name, saying

> viride Huds. Fl. Angl. 385. 1762. . . . .
> A. Trichomanes ramosum L. Sp. 2. 1083. 1753 (prob. nom. opt.).

At the same time (1753) Linnaeus had two other species with compound trivial names, *Asplenium Adiantum-nigrum* and *A. Ruta-muraria*. Lamarck tried to improve upon the former by renaming it *A. nigrum* (1778) and on the latter by calling it *A. murorum* (1778). Yet all botanists reject *A. nigrum* and retain the compound *A. Adiantum-nigrum*; and it would be almost sacrilege to call the Wall Rue anything but *A. Ruta-muraria*. The present rules of nomenclature do not allow us to discriminate against the name *A. Trichomanes-ramosum*, unless it is "a permanent source of confusion or error." Decision of the latter point is not always simple nor unanimous: to the uninformed the name *A. Trichomanes-ramosum* might be a source of confusion; to the thoroughly informed not. Similarly with *Juncus alpino-articulatus* Chaix. (1786) for the plant generally called *J. alpinus* Vill. (1787), the name *J. alpino-articulatus* might easily be a source of confusion, as suggesting some entanglement with the earlier *J. articulatus* L. (1753). Absolute clarity favors the retention of *Asplenium viride* and of *Juncus alpinus*. See note under *Juncus alpinus* in Part III.

naria dawsonensis Britton, etc. *Orobanche terrae-novae* Fern.,[1] in young flower, was superabundant; *Draba arabisans*, in a characteristic form with crowded fruits, was everywhere; and in the dry humus at the summit were two Antennarias with fuscous or brown involucres, wholly different from one another and both needing names (PLATES 265 and 268).

Evening was approaching and it was necessary to go down to the waiting motor boat; and we had only just begun the exploration of Hannah's Head. From the inner edge of the area we were on we looked up river to a continuation (PLATE 234) of the mountain falling as a sheer wall of white limestone to the Humber and at its base having a splendid talus. There, of course, are other species; but darkness was coming on and we were forced to quit. The big cliff and talus, easily accessible, still await exploration; and to the north, back of Hugh's Brook, we could see still another white wall, not yet reached by a botanist. Still further, Howley's geological map shows this band of limestones on the western border of the Long Range to extend for more than a hundred miles northward, cut into at their eastern ends by the antler-like arms of the bays and inlets—all unexplored! Hannah's Head, coincident with its change of name to Mt. Patricia, verily stands out as a princess among Newfoundland headlands.

In 1898, the late Rev. Arthur C. Waghorne, most active of resident botanical explorers, collected in woods at McIver's Cove, near the northern entrance to Humber Arm, an extraordinary willow. The fragmentary specimen in the Gray Herbarium has proved baffling to everyone who has tried to place it with any recognized species. It has been unsatisfactorily placed with *Salix phylicifolia*, *S. Barclayi* Anderss., *S. Barclayi* subsp. *latiuscula* Anderss. and *S. discolor*, but it differs from all of them in some very important characters (to be discussed in Part III). We were anxious to rediscover it and to secure abundant material; but on the day set a strong wind came up and it was necessary to wait until the calm of late afternoon. When we got to McIver's Cove we found that the older people well remembered Waghorne and his visit there; but no one in the village had ever seen or heard of a *wild* willow. They had plenty of *S. viminalis* planted, but they were so thrilled at the idea of a willow being really *native* in their cove that a good proportion of the population joined

[1] RHODORA, XXVIII. 235 (1927).

in the search. In three or more parties we scoured the region until darkness (about 10:30) cut the search short; but when we left we agreed with the statement given us on first landing, that at present no native willow grows at McIver's Cove.

Mr. James Pennell, whose extensive grounds at Curling contain many interesting garden plants, showed us a handsome shrub which he and his father had transplanted from a thicket at Hugh's Brook. The shrub is *Crataegus laurentiana* Sargent; and, since any native *Crataegus* is rare in Newfoundland, we were glad to see it. Heretofore our only stations for the species had been on the banks of the Exploits.

Mr. S. Wheeler, a merchant at Curling, who had had much experience as a mine-prospector in the West and who intimately knows the mountains and the different rock-outcrops about the Bay of Islands, wanted us to see the Middle Arm. We and others before us had seen much of the Humber Arm, and Long and Fogg had seen the dreary serpentine wall of the North Arm, but we had never visited the Middle Arm. In imitation of the charity-supported but rapidly breeding "fishermen" we had once encountered farther north, who, content with their dole, argued "There are no fish, so what's the use of going out?", we should have repudiated the proposition a day or two earlier. But in the meantime we had been introduced to Hannah's Head, and nothing but the now undesired arrival of the "Sagona" would keep us from making the trip.

Mr. Wheeler was obliged to close his store for the day; the trip from Curling to Middle Arm Point, thence in to the head of Goose Arm or of Penguin Arm and back to Curling, would take much of the day (more than fifty miles, all told). He, therefore, invited us to breakfast with him in the early morning and to allow him to take coffee pot, frying pan and food for the trip; and on July 16, with Mr. Wheeler as experienced guide, wise philosopher and genial friend, we went for an 18-hour trip to the Middle Arm. It was after midnight when we got back; our three large collecting boxes were quite inadequate for the specimens; and we had given a small portion of the Middle Arm only the most hasty "once over." Whereas Humber Arm has many villages and from Petrie's Point to Humbermouth is cleared and denuded by man and fire, the Middle Arm is not only almost uninhabited but is bordered on all sides by high unspoiled cliffs of fantastically twisted limestones and calcareous slates. The moment

we rounded Middle Arm Point we were anxious to land, but our wiser counsellor calmly replied: "We haven't got anywhere yet."

At Cutwater Head, however, he drew in under the steep talus. Scrambling ashore, we started up the loose slaty debris only to come sliding back to the starting point. One turfy and bushy island on the talus was finally reached and there we anchored by means of our botanizing picks, reassembled our lost breaths and looked about: the usual masses of *Hedysarum alpinum* L. with its ornamental pink racemes; silvery-bronze masses of glistening *Shepherdia canadensis*, everywhere common in western Newfoundland but always puzzling us in the distance by its varied lustre; *Salix vestita* Pursh, as lovely a willow as grows, with satiny-white under surfaces and dark green

Map 3. Range of OXYTROPIS FOLIOLOSA.

upper surfaces of the rounded leaves, the large terminal buds red or purple; the regular Saxifrages of such places; *Artemisia canadensis*, scarcely in flower and delicately fringe-like; and numberless other calciphiles of which we never tire. With time only for the briefest of collecting, we brought our eyes to our insular anchorage: *Oxytropis foliolosa* Hooker (MAP 3), the rare Rocky Mountain species with 1-sided racemes of royal-purple flowers, heretofore known in eastern America only from shores of Hudson Strait and of the Straits of Belle Isle; *Astragalus eucosmus*, at our first station in western Newfoundland from south of Pistolet Bay; the most gigantic of Dandelions, a species of *Taraxacum* which we already knew from the Straits of Belle Isle,

Up the Humber from Hannah's Head (upper);
Marble Mt. at right, Mt. Musgrave in background.
Horizontal Limestones, Old Port au Choix (lower).

the Mingan Islands and Anticosti, with extraordinarily large involucres, apparently an undescribed species (to be described and illustrated in Part III). Here, as on the other taluses we visited, *Primula laurentiana* Fern. and the more delicate *P. mistassinica* abounded, as did the subarctic *Festuca rubra* var. *arenaria* (Osbeck) Fries, *Parnassia parviflora*, and other less significant species. We wanted to search further, for we had collected only from a stranded bit of turfy carpet, and the talus and cliffs of Cutwater Head cover a vast area; but a gentle, though authoritative, "We haven't got anywhere yet" brought us back to the motor boat.

The western slope of Penguin Head looked so interesting that we spent a full hour there; then, rounding the point, we landed on a very different slope, merely the eastern dome of the same Head. Finally, after a few minutes on Druid's or Raglan Head and alluring glimpses up Penguin Arm and Goose Arm, with their unvisited limestone walls, we turned back, regretting the "Sagona" and the obligation to catch her. At ten o'clock Mr. Wheeler further tantalized us by stopping under the big cliffs at Cod Cove. It was twilight but we could see the big-headed *Taraxacum* again, though it was too dark to tackle the slippery wall. With this diverting background, we "boiled the kettle" and our day's botanizing was over: acres of "Limestone Polypody," *Thelypteris Robertiana; Kobresia simpliciuscula* (Wahlenb.) Mackenz., as fine as we had ever seen; *Carex rupestris* All., not previously known from the Bay; the arctic *Potentilla nivea* L. and *Dryas integrifolia* Vahl; *Rhododendron lapponicum* (see comment on p. 10); *Solidago multiradiata* Ait., the most northern of American goldenrods; one of the new brown-headed species of *Antennaria* (PLATE 265) of Hannah's Head and another (PLATE 268), very beautiful, with 1 or 2 white heads, a plant we had never before seen in Newfoundland; and the Newfoundland phase of *Arnica chionopappa* Fern. which Rydberg has dignified with the name *A. Fernaldii.*

At the opening of the week we had keenly regretted the necessity of waiting at much-botanized Bay of Islands; now we almost resented our promise to our hosts at Old Port au Choix to arrive on the next trip of the "Sagona." Only a very limited area about the Bay of Islands has really been closely botanized; we could spend a whole season with a center there, and then not exhaust the rich areas. We can't do it all. Most fascinating exploration awaits the right party; but, to do effective work they must be able to climb and they

should not waste time and strength on the "taboo-list" of ubiquitous and unsignificant plants!

We reached Old Port au Choix soon after sunrise on July 19th, planning to secure the desired *Salix* and anything else overlooked by Bachelot de la Pylaie in 1820 and by Wiegand, when he barely reached Pointe Riche from the south in 1910; then to be taken over to St. John's Island for the *Taraxacum;* and, finally, to catch the "Sagona" three days later on her trip south. On July 28th I wrote Mr. C. A. Weatherby a letter from which I excerpt passages which intimate why we were still at Old Port au Choix.

"Finally, the Sagona sailed on the 17th. On board were Mr. and Mrs. Morris, en route to Flower Cove, thence 48 miles by motor boat to Cook's Harbor to photograph *Habenaria straminea!* They had been waiting *ten* days at a neighboring village without knowing where to botanize; and we were all naturally aggrieved that we hadn't joined company for some of the real botanizing.

"We had selected Old Port au Choix for a short visit partly because the horizontal limestones of northwestern Newfoundland here come to the surface [PLATE 234] along every cove, forming extensive gravel (angular and very sharp)-covered barrens [PLATE 235] for miles around. Looking out our windows we see bare crests in all directions, and on the points (or 'heads') high cliffs with *very* high talus. The village occupies a narrow isthmus (perhaps ¼ mile across) [PLATE 235] between St. John Bay at the north and Ingornachoix Bay at the south, so that motor boats can be taken in either direction, without having to go many miles around Pointe Riche. Back of us to the north, with its southern edge 10 miles away, lies the range called The Doctor Hill, and beyond that, to the north, its mate, Bard Harbor Hill, where we got so many fine things four years ago.

"The people of Port au Choix (two miles away) and Old Port au Choix are the most intelligent and modern of any we have been thrown with in the 'outports.' The 'agent' (manager of fishing, etc.) is an interesting man, and our hosts, Stanley Lavers and his wife (*née* Breton) are a splendid pair. Mrs. Lavers had French parents, which is a salvation to our digestions. At most places in Newfoundland we get the horrible English cooking, gone a few degrees worse: boiled potatoes, brassicaceous vegetables (if any) and poor bread and soggy steamed puddings. But here we find a big house, with

three large spare rooms, a fine garden, cream-giving cows, plenty of eggs and poultry; and we live high—salmon, fresh cod, halibut, lobster, rabbit, poultry, cream that stands up in mounds (served on almost everything, including lobster), lettuce, carrots and greens! How can we ever get into training for mountain-climbing? Mrs. Lavers quickly recognized our dislike of grease and she boils, steams, bakes or broils everything; we are so satisfied with our home and our splendid food that we have eliminated some other projected areas and are staying on and on. This, however, is not botanically disadvantageous, for every day we bring in one or more 'n. sp.' or species 'new to Newfoundland.' Our 'laboratory' is the adjacent store of Narcisse Breton, a general store now going out of business, so that there is only a meagre remnant of stock on the shelves and we have only 1–5 purchasers visit us daily! Instead, the shelves are stacked with driers, ventilators, etc., and we put up our specimens on the counters. The visitors come for impossible purchases and then linger to comment on the beauty of our 'flowers' and they gladly give us the local names for the showy ones.

"The weather has been perfect, clear and rainless through the day, with showers in the night; consequently, we have been embarrassed by full presses and the temptation to go daily to a new headland or prairie-like barren, working three or four hours after supper putting things into press. I brought 1000 driers but we need twice as many and have to shift and manipulate to get out enough to put up each day's collecting; and, at that, we prepared a 'taboo-list' of a hundred or more species too generally distributed to collect. *Antennaria* and *Arnica* occupy much of the time. We have, I suppose, fifteen species of *Antennaria* collected in large quantity, at least five of them new species, some very peculiar, and several previously known only from the type locality many miles away. Everywhere we go *Arnica Fernaldii* Rydb. is seen, but always scattered; similarly *A. terrae-novae* [PLATE 270] and another (the handsomest of the group [PLATE 269] with stiffly erect fuzzy leaves [*A. tomentosa* J. M. Macoun]) are scattered all about. But on one side of one peninsula we came across a freely stoloniferous little species (*A. Griscomi* of the Shickshocks), making solid carpets on the turfy slopes and looking like our lawns of dandelions. And speaking of *Taraxacum*, that genus is in full swing, with many very different species.

"We very promptly came upon *Habenaria straminea* all about us—

the deliciously vanilla-scented species Morris has gone so far to photograph! He may be returning south on the 'Sagona' this afternoon or tomorrow morning and I haven't the heart to break the news to him. Nor do I know whether to disconcert his plans by showing him another *Habenaria.* In 1820 Bachelot de la Pylaie spent eight days about Ingornachoix Bay and in his 'Voyage' he spoke of finding *Platanthera bifolia* of Europe. His record has always been discredited; but last Sunday, while Long was at home writing the weekly letters, Fogg and I took a stroll before supper (with our eyes shut, for it was Sunday) and in the heath-barren (*Empetrum, Dryas* and *Juniperus*) found a yellowish-flowered *Hab.* with two basal leaves, presumably what De la Pylaie had seen, though not really *H. bifolia.* Subsequently we have collected four other numbers of it and now pass it by—all in dry limestone barren.

"From my place at table I look out on a fine cliff a mile away, but one has to go there to learn that its crest is covered with two tiny arctic *Carices* [PLATE 247] quite new to us; and so it goes. Nineteen years ago Wiegand got a sterile branch of a strange willow at Pointe Riche. It has been recognized by both Schneider and me as a very distinct new species, but the material is wholly inadequate. It was that which really decided us on coming here—over one boat. We now have a beautiful series [PLATE 254], a handsome species nearest *S. lanata* of Lapland and Scotland. . . . I won't try to list all the hundreds of plants of real interest. It is a vast country and we have to omit 99% of it."

Nor in this supplementary account will I enumerate them all nor try to give the daily discoveries with exact chronology. As stated in the letter above quoted, it was impossible to go to a new stretch of open barren or to a new headland without adding to the novelties discovered. *Antennaria,* which we thought we had already well collected, was as thrilling as ever; one plant, abundant hereabouts, forming broad rosettes and having the brown heads with almost gamophyllous involucres (PLATE 264)—enough, except that in everything else it is a perfectly good *Antennaria,* to throw it out of the genus!; another, forming little barrel-shaped or columnar plants (PLATE 263) with an amazing number of cauline leaves; others, old friends, such as the very rare *A. Wiegandii* Fern. which we discovered four years earlier on St. John's Island, or the widest-spread species in Newfoundland, the green-leaved and white-headed *A. spathulata* Fern. But, since the

LIMESTONE BARRENS, OLD PORT AU CHOIX (upper).
LIMESTONE BARREN, ST. JOHN ISLAND (lower).

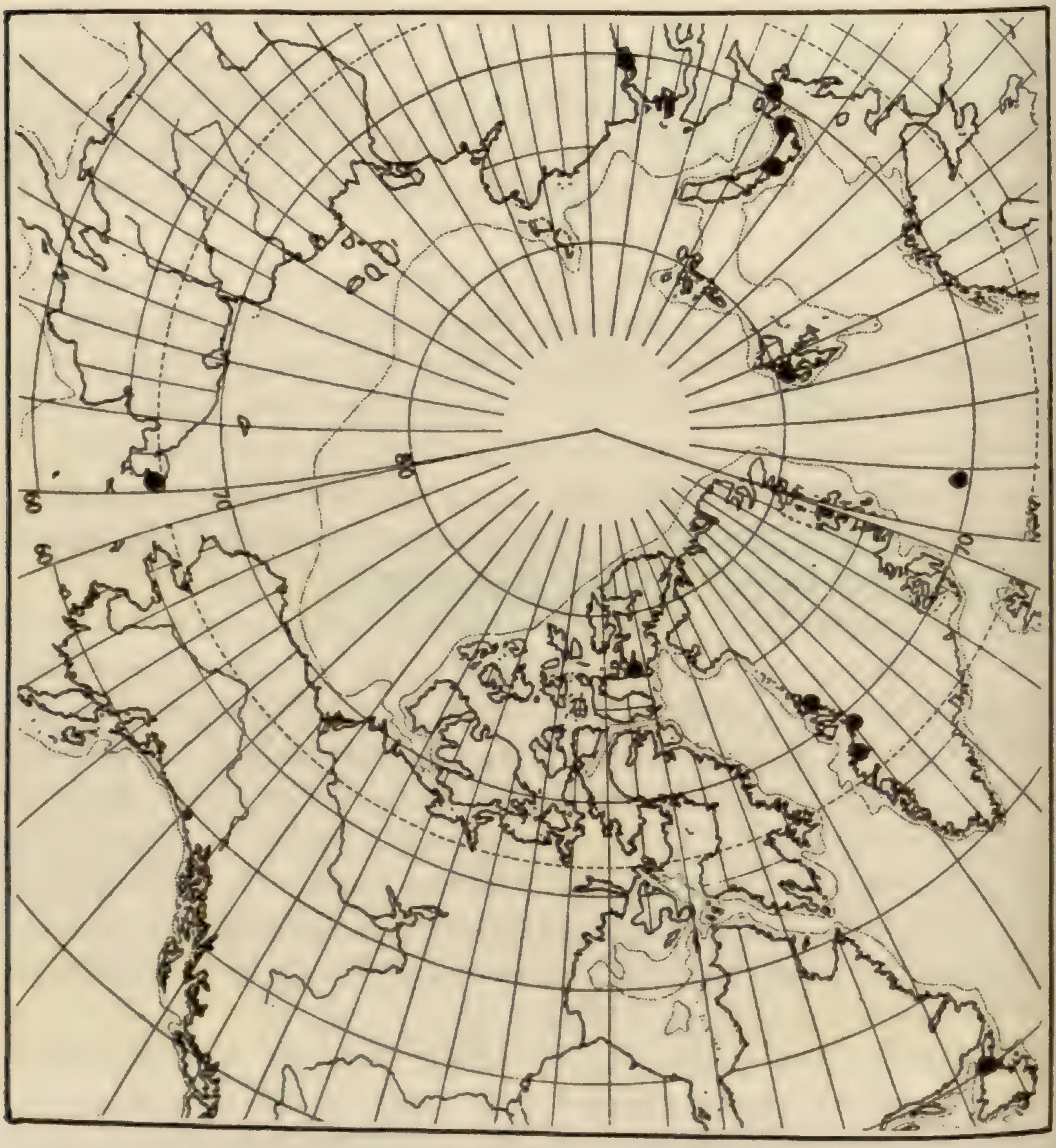
genus *Antennaria* in Newfoundland will be specially treated in Part III, it need not receive further attention here. *Arnica*, too, has been sufficiently discussed for the present. In general, the dry barrens and open slopes were carpeted with a fine assemblage of willows, all of them well known from western Newfoundland (except the new species related to *Salix lanata*), but enough to make a New Englander take notice: *S. reticulata* L., *vestita* Pursh, *Uva-ursi, arctophila* Cockerell, *cordifolia* Pursh (in great variety), *calcicola* Fernald & Wiegand and *candida*. In one depression on Pointe Riche *S. pedunculata* Fern., a large shrub with great aments nearly a decimeter long and previously known only from near the Straits of Belle Isle, made an extensive thicket.

On the dry barrens (PLATE 235) it was impossible to predict what would appear next. *Agrostis paludosa* Scribn., here as elsewhere inclined to belie its name, seems to be pretty clearly a variety of *A. borealis* (to be discussed in Part III). *Scirpus rufus*, which we had always considered a strict halophyte, here ran well back into the barrens, where it mingled with *Carex glacialis* Mackenz. and the always puzzling Drabas or with various forms of *Calamagrostis inexpansa* and the baffling forms of *Agropyron*.

In the letter above quoted reference was made to two tiny arctic *Carices;* they grew together on the dry barren back of Gargamelle Cove. One, the tiniest *Carex* I know, except the arctic *C. ursina* Dewey and *C. glacialis*, proves to be the high-arctic *C. incurva* var. *setina* (Christ) Kükenth. (PLATE 246, MAP 4), originally described from arctic Siberia, but now known also from Spitzbergen, Jan Mayen, western Greenland and Ellesmereland. Here, in latitude 51°, it is at sea-level and its interlocking companion is a new species (PLATE 246) which has been elsewhere found only in Greenland (to be discussed and illustrated in Part III).

Comandra Richardsiana was splendidly flowering and the *Lesquerella* of western Newfoundland and Anticosti (PLATE 258), which has been passing as the arctic *L. arctica* (Wormskj.) Wats. or as its var. *Purshii* Wats., was scattered in the dry shingle. Abundant new collections from Newfoundland and beautiful material of *L. arctica* recently received from Dr. Morten Porsild strengthen the conviction that our plant is not *L. arctica;* this matter will be further discussed in Part III. The little Tansy of northwestern Newfoundland, *Tanacetum huronense* var. *terrae-novae* Fern., crept through the

gravel, forming beautiful white plumes of foliage, with great golden buttons of flowers; and the monotony of ubiquitous but always beautiful *Dryas integrifolia* was occasionally broken by patches (mostly sterile) of the white-pubescent var. *canescens* Simmons, described from Ellesmereland but already known on Table Mt. at



Map 4. Range of CAREX INCURVA, var. SETINA.

Port au Port. In one dry thicket I was pleased to greet *Amelanchier Fernaldii* Wieg., a northern extension of range; and on one strip of gravel on Pointe Riche we came across *Campanula rotundifolia* displaying every conceivable variation from the common linear-

leaved extreme to others with oblong or even narrowly ovate cauline leaves, the latter var. *alaskana* Gray.

So much for some of the plants of dry barrens. Where it was slightly less dry, in humus-carpets or in depressions, *Habenaria straminea* Fern. (PLATE 251) abounded. The other *Habenaria* (PLATE 252), about which I wrote Weatherby, proves to be an extreme variation of the continental *H. Hookeri* of acid peats of woodlands, in northwestern Newfoundland known only in open limestone barrens. Its behavior is quite as reprehensible as that of *H. orbiculata*, discussed on p. 8. Another Newfoundland orchid, *Cypripedium parviflorum* var. *planipetalum* Fern. (PLATE 250), abounded in the peaty spots, very handsome and strikingly unlike the continental plant in its short and broad flat petals.

In a single unusually wet depression (wet enough to have standing water) on Pointe Riche the very rare and most distinct *Drosera linearis* made almost continuous turf. In Newfoundland we had previously known it only on the serpentine or magnesian limestone of Blomidon. In such places, also, *Carex bicolor* All. and *C. microglochin* Wahlenb. abound; and it is here that we look for *Epilobium davuricum* Fisch. and *Juncus albescens* (Lange) Fern. (PLATE 249). The latter species takes the place in northern North America of the European *J. triglumis* L., but, since the distinctions have only recently been pointed out (RHODORA, XXVI. 202), it is desirable to illustrate them.

The visit to Bard Harbor Hill and to Doctor Hill in 1925 had yielded so many good things that we wanted to get back to the mountains, especially to try the southern and eastern portion of Doctor Hill. So, with Mr. John Lavers as guide and aided by Mr. Allan Ofrey, we left the latter's place at Eddy's Cove on St. John Bay (Old Man's Cove of the charts) on the morning of July 30th and packed in to the southern slope of Doctor Hill, which on this side presents wonderfully accentuated terraces (PLATE 236) in the hard quartzite rock. Camp was established near timber-line on Deep Gulch and in the afternoon the first botanizing began. Deep Gulch, like the gulches on the northwest side of Doctor Hill and on Bard Harbor Hill, explored in 1925, has precipitous walls of thoroughly rotted rock and so does the next gulch to the west, the head of Yellow Brook. It was positively dangerous to climb far out on these walls, for great blocks would suddenly break out and go bounding down the ravine, to start others and, perhaps, an avalanche. Botanically Deep Gulch and Yellow

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Brook were very similar to Deer Pond Gulch and Northwest Gulch on Bard Harbor Hill. Thickets of *Vaccinium ovalifolium* Sm. in young fruit and of *V. nubigenum* Fern. (PLATE 260) in young flower covered many dry banks. The difference in flowering season is striking. Repeatedly in the Shickshock Mountains and on the Doctor Hills we have found the same situation: in many years of field-experience with *V. ovalifolium* I have never been early enough to see flowers, but *V. nubigenum* lingers and flowers by the snow-banks into August. *Poa laxa* hung in fringe-like lines from the crevices of the rock, particularly on one precipitous wall which we could never approach without stirring the solicitousness of an eagle which, fearful for the nest, circled continuously above us until we got into another fork of the gulch. *Viola palustris* was just flowering, as was *Epilobium lactiflorum* Hausskn., both very local in Newfoundland. The crimson-flowered *Streptopus oreopolus* Fern., abounded; and many places by the brookside, especially at the head of Yellow Brook were bordered by as fine clumps of *Athyrium alpestre* as those on Deer Pond Brook and in the Northwest Gulch. The Newfoundland plant is, apparently, much nearer to the typical Eurasian plant than to the two varieties in continental America.[1] The gravels and rocks in the brook as it descended the terraces were beautifully carpeted with *Epilobium Hornemanni*, *Alchemilla vulgaris* var. *vestita* (Buser) Fern. & Wieg. and var. *filicaulis* (Buser) Fern. & Wieg., the blue-flowered *Veronica humifusa*, and other species delightful to see but already well known from the Doctor Hills. On broad flats along the brook, with *Angelica laurentiana* Fern.,[2] *Epilobium angustifolium* had extraordinarily broad leaves (elliptic and 4–6 cm. broad), the Alaskan var. *macrophyllum* (Hausskn.) Fern.,[3] heretofore known in the East only from the Magdalen Islands. About the heads of the gulches, where the heathy turf hung over from the terraces and the upper tableland, *Salix herbacea*, *Phyllodoce caerulea* and *Carex stylosa* C. A. Meyer, all rather localized species in Newfoundland, occur.

The open tableland (PLATE 236) itself was a disappointment, too dry for any but the most extreme xerophytes of any bleak and arid silicious summit. In a few places, where a damp sphagnous carpet occurred, the plants were the most ordinary of species of any wet peaty lowland in New England or even the Southeastern States. It

[1] RHODORA, XXX. 48, tt. 165, 166 (1928).
[2] RHODORA, XXVIII. 222 (1926).
[3] RHODORA, XX. 4 (1918).

Terraces, southern slope of Doctor Hill (upper).
Unremoved Angular Blocks, tableland of Doctor Hill (lower).

was not thrilling to collect *Osmunda cinnamomea*, *O. Claytoniana* and *Carex canescens*. We badgered Mr. Lavers to produce an alpine lake or at least a bog, but the best he could do was a slight depression in the midst of the dry lichen-crusted blocks of rock. Here were two variations of the lowland *Carex vesicaria:* var. *jejuna* Fern.; and another (PLATE 248), undescribed, with very long and broad purple scales. *C. lenticularis*, *C. brunnescens* and other uninteresting species were here, and one very striking sedge. This formed great hassocks or "nigger-heads," much like those of *Carex stricta*, standing as vertical columns a foot or more high and consisting of ropy interwoven dead roots (much suggesting a small tree-fern). The two inches at the summit were a thin and dense turf (living on the dead waste of its own past years) of short leaves and miniature culms (up to 4 cm. high), with purple spikes often only 2 mm. long, but sometimes up to 1 cm. or more. This looked like "something"; but the best I can do is to make it out a starved and overcrowded state of the most variable and least interesting of mountain *Carices*, *C. concolor* R. Br. (*C. rigida* Good., not Schrank). Somehow this meagre and uninteresting sedge seemed to epitomize the botanical status of the southern tableland of the Doctor Hills, a poor place when contrasted with Bard Harbor Hill and the calcareous northwest slope of Doctor Hill at John Kanes's Ladder.[1]

The boggy barrens ("barrns") and swales between Deep Gulch and Eddy's Cove had looked interesting, so, on the way out, we lingered at some of them. *Thelypteris cristata* (*Aspidium cristatum*) abounded in one of the swales, a real extension north; and the rather rare *Ranunculus Macounii* was abundant in swampy woods. *Epilobium nesophilum* Fern.,[2] a species of the region about the Gulf of St. Lawrence, abounded; and in one limy bog, where *Juncus stygius* var. *americanus* and *Parnassia parviflora* were abundant, we were amazed to find quantities of *Parnassia caroliniana*, quite new to Newfoundland.

The woods near the settlement at Eddy's Cove are terribly overrun by cattle, and almost none of the unspoiled forest-carpet remains. While Stanley Lavers and his father were packing the motor boat for the return to Old Port au Choix, Long, never through botanizing until the boat is leaving, crept on hands-and-knees among the ruined

[1] RHODORA, XXVIII. 125, 126, t. 155 (1926).

[2] RHODORA, XXVII. 32 (1925).

and pastured knolls; and, when "all aboard" was shouted, he came half-beaming, half-reluctant, to the shore. For he held *Calypso bulbosa,* one of the rarer Newfoundland orchids, which the cattle had not wholly exterminated; and with it *Listera borealis* Morong, the northern cordilleran species which Marie-Victorin had been finding in the sea-shore spruce thickets of Anticosti and the Mingan Islands.

Long had but one individual of *Listera borealis* and he wanted another, for the agreement was that the *first* set of specimens should come to the Gray Herbarium! So, on August 5th we tried again. Some years ago Wiegand, Bartram and I were anxious to get upon our labels for the East Coast the localities, Lushe's Bight and Mosquito Bight, to say nothing of Come-by-Chance and Seldom-go-by; so, our party of 1929 having got into training by the mountain-trip, we now yearned to see our names on a label opposite the locality, Bustard Head. But, alas! no one seemed to have heard of the place and when we showed them our maps and charts they merely said, "Oh! Back Cove." Geographic nomenclature in Newfoundland follows neither the rule of strict priority nor established usage. The Highlands of St. John of all charts are now The Doctor Hills; Allan Ofrey lives at Eddy's Cove, but by the charts it is Old Man's Cove; the old Poverty Cove on the Straits is now Sandy Cove; the names of half the localities on our labels of 1910 are now obsolete, and in a few years our present labels may have become unintelligible!

Starting out on a real search for *Listera borealis,* we first landed on two islands at the entrance to Old Port au Choix, Savage's Island and Grassy Island. Both islands had the lushest of vegetation, but mostly the maritime species expected; and both were largely dominated by the gigantic *Angelica laurentiana* Fern., which grew in our door-yard on the mainland, but here made dense thickets. And both had the most beautiful *Carex incurva* Lightf. which could be imagined, great lawn-like slopes of it 2 dm. deep, with globose-ovoid heads more than a centimeter thick. *Arabis alpina* L. was dominant on Grassy Island and the beautiful sky-blue *Gentiana nesophila* Holm[1] occurred sparingly on Savage's; and nesting terns were greatly disturbed by our presence. We wanted to go on and examine the other islands in St. John Bay (it had been so rough or we had been so busy that we had not crossed to St. John's Island for the *Taraxacum*); but we had

[1] Holm, Ott. Nat. xv. 111, 180, t. 13, fig. 6 (1901).

started for Back (or Bustard) Cove and for Eddy's (or Old Man's) Cove for the *Listera*.

Fogg and I were landed at the former place and were to follow the shore for four miles to Allan Ofrey's; Long went on to renew the search at the original spot. Fogg and I had a beautiful day, but with no very important discoveries: *Parnassia caroliniana* again and, of course, fine colonies on the turfy shores of *Malaxis brachypoda* (Gray) Fern.,[1] the little American orchid which has been mistaken for the European *M. monophyllos* (L.) Sw. *M. brachypoda* is probably more abundant in the limy region of northwestern Newfoundland than anywhere else; and, since doubt of its specific distinctness has been raised, it seems desirable to show the contrasts photographically (as PLATE 253).

Reaching Allan Ofrey's little house (a tiny house with a large family) in the late afternoon we were met by Long. We all had the same sad report: no *Listera borealis*. He and the cows before him had got it all; but we optimistically feel that another year (especially in July, instead of in August) it will be found in quantity. Accepting the cordial invitation of Allan and Mrs. Ofrey to have tea with them, we hailed the waiting boat crew and all hands crowded into the little kitchen and enjoyed such a delicious feast of lobster, lettuce, cream and hot biscuit as we shall never forget; but, while eating the rich cream, we could not help mourning that we were not getting *Listera borealis* and *Calypso* in undigested form. Then we went out to the canning shed, where we were given an explanation of up-to-date lobster canning, with all its carefully inspected details of disinfection. Then nothing would do but that we must have our pockets filled with cans of freshly put-up lobster!

The hearty cordiality and unspoiled enthusiasm of the Newfoundland fisherman, once the ice is broken and the restraint of diffidence removed, is proverbial. On this trip, as on a previous one, we had heard much of the great botanical promise of the distant Rubbly Hills. So, when we asked Allan if, some year after the lobster season is past, he could guide us to the Rubbly Hills and to give us an idea of the expense, we were gratified and not at all surprised by the answer: "Shure, I'll go wid yez. D'ere's nuttin' I loves so much as trabbelin' ober de country, and I always likes to go wid fonny folks. I've got me motor boat; dat don't cost nuttin'. I've got plenty of lobster

[1] RHODORA, XXVIII. 176 (1926).

and rabbit; dey don't cost nuttin'. We may have to borrow a dory; dat don't cost nuttin.' Den w'en we comes out you might give me a little somet'n if you feels like it." It has been a real grief that, as yet, we haven't been able to carry through so promising a trip to the Rubbly Hills.

There was plenty more to do; but we felt that, in the interest of fair play, we ought to leave something for others to discover, and that, in the interest of science, it would be well to see wholly new territory.

No answers had come to my inquiries for appropriate headquarters at Trout River and at Fox Island River (coming off the Lewis Hills), and on the "Sagona" Constable Bussey and Mr. Jenkins (one of the political pillars of the West Coast) had sorely tempted us by telling of the fine home and kindly hospitality of Mr. W. A. Preble at Woody Point in Bonne Bay. Bonne Bay had been visited by Wiegand in 1910 but only slightly explored, since his companion at that time became ill and Wiegand was forced to work alone. At two different times former students of mine had spent periods there, but, with no previous knowledge of the flora, they had inevitably been unable to discriminate between the interesting and the uninteresting, and they, naturally, did not know how to tell the really promising spots. From various trips on the steamer into the Bay, ranked as the most picturesque inlet south of northern Labrador, we felt that there must be good and quite novel botanizing there. That was what we were after.

So, early in the evening of August 7th, limp and dejected after a very pitchy voyage, we landed at Woody Point. The Preble mansion, outstanding for its architectural superiority and its beautiful garden with rows of fruiting strawberries and raspberries, was a landmark; and we promptly invited ourselves to be the guests of Mr. and Mrs. Preble. The genial and kindly owner did not see the matter from our viewpoint, however: the daughters had gone to Boston whence their grandfather, the late Dr. Preble, had originally come to Bonne Bay as surgeon for a Yankee fishing concern, and Mrs. Preble had no household help; all the travellers stopped at Mrs. Crocker's. Mr. and Mrs. Crocker together peeped out at us through the crack of a slightly opened door and explained that they never take boarders; besides, Mrs. Crocker had a hard cold and must not take on extra work. It was necessary to play a trump card; so I asked if she had seen a doctor and suggested that some of the medicines in our outfit

THE TABLELAND AND WOODY POINT, BONNE BAY, IN JUNE
(Photograph by *S. D. Grant*).
DIORITE PINNACLES, WESTERN HEAD, BONNE BAY (lower).

might help her. The effect was instantaneous: "Come right in. The right man in the right place!" Thus we found a home at Bonne Bay and soon monopolized Mr. Crocker's carpenter-shop and work-benches as our own.

Like the Bay of Islands, Bonne Bay has three main Arms and, like the names of localities on the Bay of Islands, the names on the charts and maps have little or no reflection in local usage. Woody Point (PLATE 237)[1] lies under the sombre, green, eastern slope of Lookout Mountain, at the southern entrance to what the charts call the "South Arm," but by the inhabitants known as "West Arm"; the finest botanizing is on the limestone cliffs which shut in the south side of "Main Arm" (called on the charts "East Arm"); while to the north-west of Main Arm there extends a slender branch of the antler-like Bay, locally, and to us inexplicably, known as "East Arm," but on the charts called "Deer Arm."[2]

[1] For the use of the picture, showing The Tableland covered in June with snow, I am indebted to SAMUEL D. GRANT, Esq. of Trinity and Blanc Sablon.

[2] I could not help recalling my first encounter with Newfoundland geographic usages. Alfred Kidder (the archaeologist) and I were about to start from Birchy Cove (now called Curling) on a canoe-trip, with Harry MacWhirter as guide, across the Island, by way of the East Branch of the Humber. Harry's directions, as I now remember them (the lapse of a quarter-century may have obscured the names), were: "Ship the canoe and heavy stuff on the freight; bill it to MacGreggor and tell the conductor to put it off at Sandy Lake. Then, next day, we will go on the express. Buy tickets to Howley and ask the conductor to let us off at Goose Ponds." We were properly mystified but followed directions, though, next day, when the train stopped at a lonely platform, marked "Avateer," and we alighted beside our camp-equipment and canoe, our understanding had become further perplexed. The whole situation was promptly cleared by Harry's explanation: "Why, you see it is this way: this place belonged to Pratt in St. John's and then he sold it to Baggs Brothers!"

(To be continued)

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. FERNALD

(*Continned from page 63*)

From Woody Point (PLATE 237) one looks back to the Canadian forest on the slope of Lookout Mountain and across to the alternately wooded and bare slopes on the opposite side of the Arm. Farther up the Arm, but standing some miles to the south, is The Tableland, a flat-topped and great, seemingly naked block of serpentine (2336 feet high), weathered pinkish- to yellowish-ochre and looking like a gigantic pale brick wall, only streaked down its side with lines of white snow-fields. Lesser rounded knobs lie between it and the "bottom" (we should say the head) of the Arm and, towering above them, like a small Matterhorn, rises the sharp pinnacle of the Peak of Teneriffe. That was our view upon landing and we were impatient to get everywhere at once.

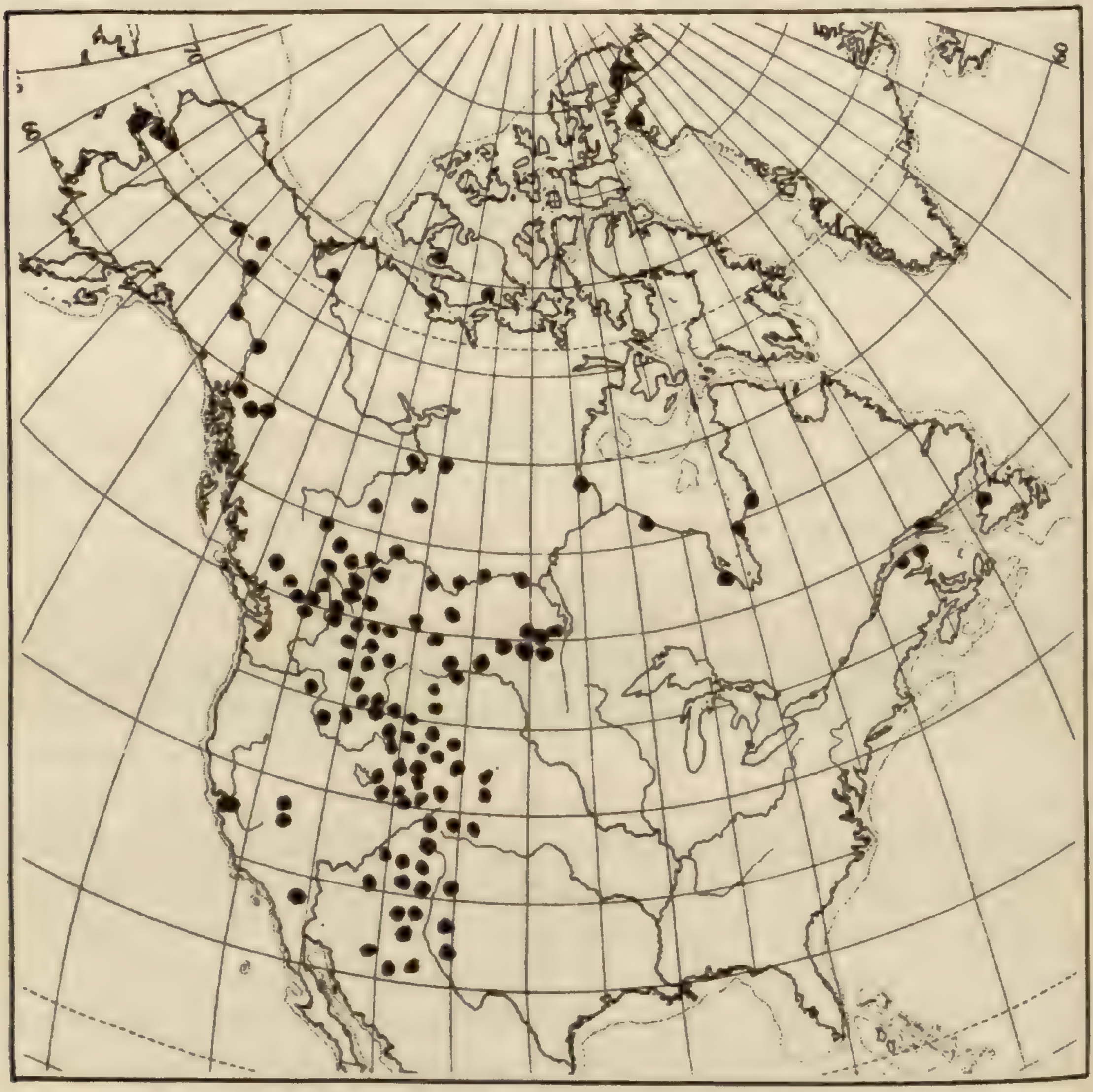
Space will not permit a detailed account of the daily knee-jolting trips and the thousand-and-one incidents of our stay at Bonne Bay. We soon discovered that it was as little "worked out" as Bay of Islands, Old Port au Choix and the dozen other areas along the West and Northwest coast of Newfoundland visited by the party of 1925. Mr. Preble promptly adopted us; and with him in his motor boat, and with a liberal supply of his fresh fruits and cream and home-made cakes, cookies and pies, to say nothing of roast chickens, we spent every day possible, from early morning to late evening, exploring the Bay and its headlands and mountains. Off days there had to be when we were forced to stay indoors caring for the presses, drying our paper in intermittent patches of sunshine and (without openly admitting it) resting our muscles and joints after the difficult climbing. Two or three talus-slopes a day were as much as we could stand;

but, when these necessary respites occurred, our ever ready and always companionable new friend was alert to hurry us through, that we might get started on another trip. Equipped with a botanizing pick and collecting box he became a fourth member of the expedition and was soon distinguishing at sight the newly found from the already collected species of *Agrostis*, *Poa* and *Festuca*. No botanical expedition should go to Bonne Bay without invoking the aid of Mr. Preble.

Whereas the Arm where Woody Point is located (I hesitate between "South Arm" and "West Arm") has several settlements comparable with those of Humber Arm of Bay of Islands, the equally extensive Main Arm is unsettled, except for the canning-factory at Lomond; and, like the Middle Arm of Bay of Islands, its southerly side is shut in by precipitous walls, repeating almost exactly the rocks of Middle Arm: fantastically contorted strata of limestone, limy slate and sandstone. To the north, beyond the slender head of East (or Deer) Arm, the round-edged block of Gros Morne (2540 feet) dominates the horizon, flanked by a series of lesser knobs; then on the northerly side of the Main Arm come two great quartzite masses, tipped at their westerly crests by conspicuous uplifted limestone cliffs, Gallie's Head (2290 feet) and Killdevil (2135 feet), and farther to the east still others beyond our reach. The south side of the Arm is almost wholly limestone, with a regular alternation of vertical walls, flanked with high talus, and coves with flats, ponds or bogs. The names, themselves, were attractive and there was romance in making landings at Shag Cliff or Tucker's Head or at Store-house Cove, Beachy Cove and Lord-and-Lady Cove (PLATE 238).

The lower slopes of limy talus (all we had time or climbing ability to get at) were a joy. "Rock Polypody," *Thelypteris Robertiana*, Holly Fern, *Polystichum Lonchitis*, *Kobresia simpliciuscula*, *Carex scirpoidea*, *Luzula spicata*, *Salix vestita*, *Saxifraga oppositifolia*, *Dryas integrifolia*, *Potentilla nivea*, *Hedysarum alpinum*, *Rhododendron lapponicum*, *Solidago multiradiata* and *Arnica chionopappa* were so common that we thought twice before collecting them; then yielded to the temptation. *Woodsia glabella*, *Sphenopholis pallens*, *Silene acaulis* var. *exscapa* and *Lesquerella* were so local that we did not hesitate; and when, high on Tucker's Head (PLATE 238), we found two individuals of *Androsace septentrionalis* L. (MAP 5), new to Newfoundland, we hunted, vainly, for more material. Mr. Preble

insists that it is not "new to Newfoundland," for he is positive that he has seen it in abundance on Gros Morne. We are inclined to believe him; but Gros Morne still awaits botanical exploration. The subalpine grass known as *Festuca rubra* var. *prolifera* Piper (PLATE 241) abounded, here, as elsewhere in Newfoundland, characteristic of cold limy walls. In its almost uniformly simple and flexuous raceme



Map 5. American Range of ANDROSACE SEPTENTRIONALIS.

(rather than forking panicle) and in its membranaceous and awnless lemmas it has always seemed to me very different from the ubiquitous *F. rubra* of circumneutral to acid lowlands. On Bonne Bay we were so fortunate as to find some culms of the normally viviparous plant with perfect florets; these have anthers so much smaller than in *F. rubra* that in Part III I shall formally treat var. *prolifera* as a definite

species. Another grass, as characteristic of these cliffs as the *Festuca* or as *Poa glauca* and *Agrostis borealis*, is *Poa trivialis*, rather general on cool slopes or in mossy openings in Newfoundland and here certainly indigenous. With the essentially boreal species it was disconcerting to find Herb Robert, *Geranium Robertianum*, abundant. Wiegand had got it in 1910, but it is highly localized in western Newfoundland. *Antennaria* was at its best. The beautiful brown-headed novelty (PLATE 265) of the limestones of Hannah's Head and Druid's Head (on the Bay of Islands) carpeted one shelf on the cliffs of Tucker's Head (PLATE 238), while another shelf supported the white-headed plant (PLATE 268) of Penguin Head.

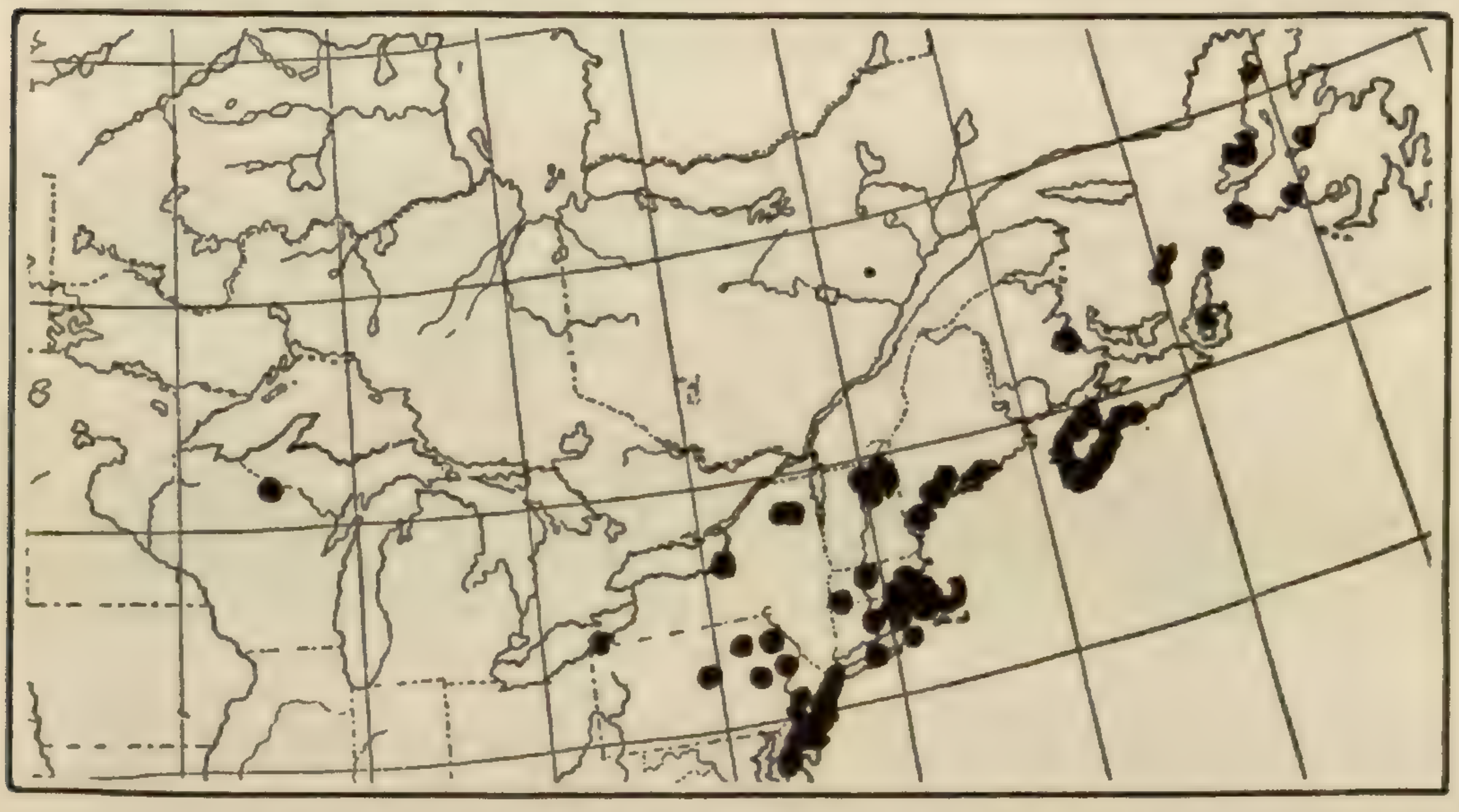
Wiegand had been on Lookout Mountain and on The Tableland in 1910; but they are such prominent features of the landscape and so emphatically contrasted with the limestone cliffs of the Main Arm that we wanted to climb them too. The day we went to The Tableland (PLATE 237) it was densely foggy in the morning, but it cleared in mid-forenoon—so clear that we ambitiously laid out a programme including The Tableland, seven miles back from the Bay, and then the Peak of Teneriffe which, deceptively, looked near-by. We got in to the northern slope of The Tableland, botanizing along Winterhouse Brook and on the lower serpentine plains, ascended by one of the snow-fields (PLATE 232) and tramped over the northern part of The Tableland proper, finally descending by a precipitous brook-valley, where, in chasms of the rock, chunks of ice 30 feet thick still lingered, and returned home. We had tramped, much of the time vertically and on the most slippery of wet magnesian rocks, about 25 miles; and the Peak of Teneriffe is still not botanized. It was a magnificent tramp and dramatically interesting but, botanically, productive of no novelties. Wiegand had got most of the specialties in 1910 and Long and Fogg had seen them on the North Arm of Bay of Islands in 1926; but, selfishly, I was delighted to see them again and, in a paternal way, so to speak (as sponsor of four of them), to reassure myself that they still abound on this great serpentine barren: *Adiantum pedatum* var. *aleuticum*, *Danthonia intermedia*, *Salix anglorum* var. *kophophylla*, *S. cordifolia* var. *Macounii*, *Arenaria marcescens* (PLATE 255) and *cylindrocarpa* (PLATE 256), *Cerastium terrae-novae* (PLATE 257) and always puzzling plants of the *C. arvense* affinity, *Lychnis alpina* L., *Conioselinum pumilum*, *Statice labradorica* and *Solidago hispida* var. *tonsa* Fern. On the lower barrens,

where it was moist and peaty, the handsome *Carex Wiegandii* Mackenz. abounds, the northernmost station yet known; and with it grows fairly typical *Pyrola rotundifolia* L., also at a northern limit. Thickets along Winterhouse Brook are our northernmost station for the New York Fern, *Thelypteris noveboracensis* (L.) Nieuwl. and for several other but inconspicuous species (in *Carex*, *Juncus*, etc.). The *Juncus alpinus* of these lower barrens was nearer the typical plant of Europe than much of the American material. But I get little satisfaction from trying to follow the recent segregations proposed in Europe (see Part III); the Newfoundland plants vary from simple individuals with 1 or 2 glomerules to others with 25 or more. These variations are very obviously responses to minor conditions of habitat. It seems sufficient to treat the Newfoundland plants as typical *J. alpinus*, with flowers all sessile or uniformly short-pedicelled; and var. *rariflorus* Hartm. (1849) (var. *insignis* Fries (1890), *J. nodulosus* Wahlenb. (1820)). Var. *alpestris* Hartm. and *J. nodulosus β. biceps et uniceps* Laestad., sometimes maintained, seem to be merely dwarf or poorly developed states. At one point *Carex Buxbaumii* had very pale (almost whitish) instead of dark scales, f. *dilutior* Kükenth., which we had never met.

We spent two days on Lookout Mountain, the first collecting on the slope and making a start on its broad tableland (the uplifted Cretaceous Peneplane), at about 1800 feet altitude. The second day we crossed the tableland and the most strenuous member of the party (B. L.) went to one of the Lookouts, bare castellated and ragged crags of rotted diorite (alt. about 2500 feet) at the western edge of the plateau. The second day was sultry, and so hot that the younger members of the party stripped to their BVD's; and, instead of enjoying the cool and bracing air of a theoretical mountain-top, we boiled and simmered all day. By afternoon, at each step we were saying, "What's the use?"; still we plodded hopefully on across the peaty barren. When we got back to Woody Point in the evening we found everyone panting, with the mercury at 100° Farenheit! Such midsummer days are not uncommon on the tablelands of Newfoundland.

Experiences on the tableland of Blomidon in 1910, on that of Lark Mt. in 1926, and others recorded earlier in this journal should have taught us; nevertheless, we went from the sea-level rocks and taluses of Bonne Bay, with their subarctic and even high-arctic species,

to the tableland of Lookout Mountain actually expecting to find an alpine flora! Instead, the great plateau is like that of Blomidon or of the Topsail region, a prairie-like expanse of peat, with innumerable shallow depressions and small pools. In the pools one finds occasional colonies of the boreal *Sparganium hyperboreum*, but much more often the Coastal Plain *Utricularia geminiscapa* Benj. (*U. clandestina*) (MAP 6) and the New Jersey Pine Barren *Potamogeton confervoides* and *P. Oakesianus*. *Pogonia ophioglossoides*, *Calopogon pulchellus* and *Habenaria clavellata* are there, and the crimson-flowered *H. psycodes* is positively dominant. *Rynchospora fusca* and *alba*, *Carex exilis* and *livida* (var. *Grayana*) and *Juncus pelocarpus* abound. Kneeling by



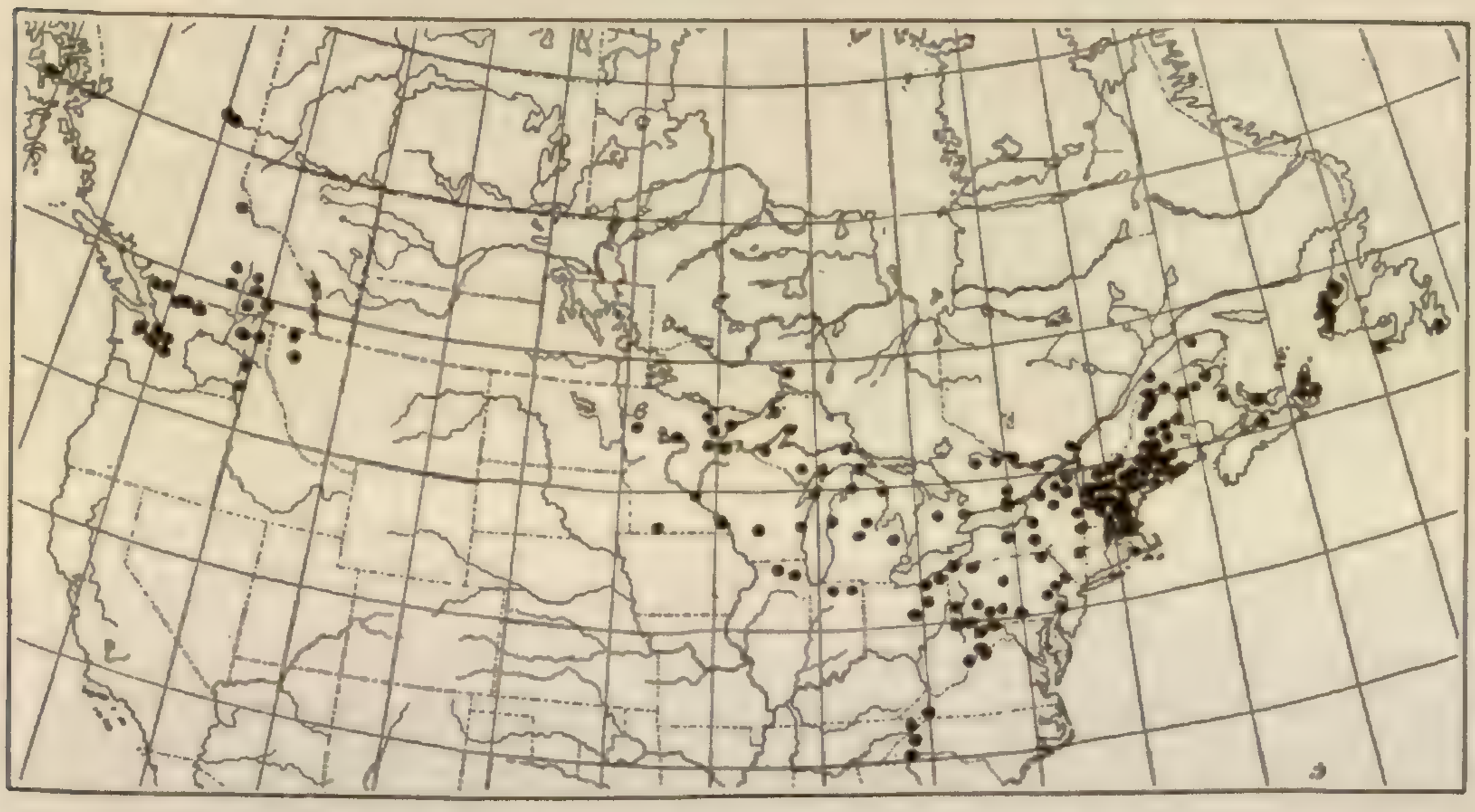
Map 6. Range of UTRICULARIA GEMINISCAPA.

the peaty pools one finds himself in the inevitable *Schizaea pusilla* (MAP 7) of the Pine Barrens, and *Bartonia*, and very often *Muhlenbergia uniflora* (var. *terrae-novae*); and in a rock-bottomed tarn nearly over to the Lookouts *Lobelia Dortmanna* (MAP 8) flourishes. The only notable plants, where we spent the most time (on both days) studying these peaty barrens, which do not occur in southern New Jersey are the *Sparganium* (*hyperboreum*), the tiny yellow-fruited *Eleocharis nitida* Fern. (which formed such dense carpets that I was inclined to jeer Long for having overlooked it in the Pine Barrens), and *Drosera anglica*. About many pools, either with *D. anglica*, *D. rotundifolia* and *D. intermedia* Hayne (*D. longifolia* L. in part, a name too confused in its application) or in extensive colonies by it-

Map 7. Range of Schizaea pusilla.

Map 8. American Range of Lobelia Dortmanna.

self, was another *Drosera*, quite strange to us. This proved to be the European *D. obovata* Mert. & Koch., new to North America. In Europe it is sometimes treated as a species; sometimes as a variety of *D. anglica* (*D. anglica β. obovata* Planch.); sometimes as a hybrid of *D. anglica* and *D. rotundifolia;* again as a hybrid of *D. anglica* and *D. intermedia.* As stated, on Lookout Mountain *D. obovata* is locally abundant, either with the other species or quite by itself, in the borders of peaty depressions. It and *D. anglica* are equally abundant; *D. intermedia* next; and *D. rotundifolia* comparatively scarce. Those who wish to get fresh material of all four together will find it in the depressions and pools to the west of the path as it reaches the table-land of Lookout Mountain. As already stated, *Habenaria orbiculata* (MAP 9) was here growing in turf of the ubiquitous arctic-alpine *Scirpus cespitosus* var. *callosus* (MAP 10). We had difficulty



Map 9. Range of Habenaria orbiculata.

in believing our own eyes and, at my request, Fogg made detailed drawings of its flowers, lest we might forget how the fresh flowers appeared; but we cannot make it anything but *H. orbiculata* of "rich woods" on the continent.

By the time we had got well up on the bases of the dry diorite peaks (the Lookouts), Fogg and I were content to linger over banks of the charming little chocolate-flowered *Euphrasia Williamsii* var. *vestita* and to let Long tackle single-handed the ragged and bleak crest. His only trophy was a mass of over-ripe *Antennaria cana* (Fern. & Wieg.) Fern., one of the most attractive of the genus, this station the first south of Pointe Riche.

Map 10. Eastern American Range of Scirpus cespitosus, var. callosus.

We, of course, wanted to get on Gros Morne, Gallie's Head, Killdevil, the Peak of Teneriffe, and other mountains of which we did not learn the names. We were, however, drawn in so many directions and were so controlled by the frequent fogs that Killdevil was the only other mountain touched. The vividness of the descriptive name reflects the reputation of its steep slope among people who have always lived and hunted among precipitous hills; and in the ascent and descent Mr. Preble, although retired for several years, showed the result of long training and greatly outstripped the boys. We had other reasons for lagging besides shortness of breath. Killdevil, where the steep path has been worn, is composed of very silicious rock; and high on its slope we found the southern *Cypripedium acaule*, at the only station we saw around Bonne Bay. We were also interested in comparing the flavors of different blueberries! At one point on a rock-slide of the quartzite a few plants of *Solidago calcicola* frankly belied its name, though we suspect that it is a waif blown in from some more favorable habitat near-by. *Woodsia ilvensis*, which we had not seen lower down, was unusually large on the

Lord-and-Lady Cove, Bonne Bay (*left*). On Tucker's Head, Bonne Bay (*right*).

quartzite cliffs; and when we reached the comparatively narrow tableland we found a very perfect demonstration of the three crowberries of Newfoundland: *Empetrum nigrum*, *E. nigrum* forma *purpureum* (Raf.) Fern., with plum-purple fruits (new to Newfoundland) and *E. Eamesii*. The summit-ridge was as disappointing as the dry slopes, with only enough *Phyllodoce caerulea* and *Carex stylosa* to keep it from being utterly hopeless. Plodding doggedly on to the west, we were suddenly conscious of an abrupt change: the regular western Newfoundland Saxifages and Drabas, *Carex rupestris*, *Solidago multiradiata*, *Tofieldia minima* and other old friends. The extreme westerly crest of Killdevil was limestone, just as if some of the limestone at sea-level, with its distinctive flora, had been torn out by the uplift of the quartzite block and carried up to 2100 feet; and, just as fate has decreed in so many cases, we reached the interesting botanizing when it was time to start back, if we were to make the shore safely before dark. But we had to investigate a little: *Woodsia alpina* here mingled with *W. ilvensis; Botrychium matricariaefolium*, *Arabis Drummondi*, *Habenaria viridis* var. *bracteata* and *Antennaria neodioica* var. *attenuata* gave a singularly southern aspect, rather than alpine; but a thicket of *Salix cordifolia* var. *callicarpaea* (Trautv.) Fern., the tallest we have ever seen (sheltered in crevices in the limestone) was decidedly more boreal; and *Potentilla norvegica* var. *labradorica* (Lehm.) Fern. and *Galium kamtschaticum*, in its shade, and *Epilobium lactiflorum* Hausskn. in the thickets of *Salix vestita*, were also boreal. Another *Antennaria* (undescribed, PLATE 266), with the largest brown heads of any in Newfoundland, made a fine carpet, strongly contrasting with the pale-headed species with which it grew. It was getting so close to twilight that we were ticklish about climbing around the rotted limestone; but Fogg volunteered to cross over to a more western crag, though he promptly returned, driven out by millions of mosquitoes which were beginning to assemble for the evening. He had *Oxytropis johannensis* Fern.[1]; and from the crest he had reached a high escarpment of limestone evidently extended for thousands of feet toward the Bay—unworked and awaiting a party with plenty of daylight. A similar high escarpment seems to occur at the westerly crest of Gallie's Head; and, through the woods to the east of Killdevil, we could see others; there is plenty

[1] RHODORA, XXX. 145, t. 173 (1928).

to do, and we should not mind if the Appalachian Mountain Club discovered the region and cut some good trails.

Mr. Preble was anxious for us to see the deadwaters of Main River, which enters Main Arm, for "every kind of flower" grows there. So, one day, August 19th, we landed on the alluvial flats, planning to follow up river four miles to his flower-garden. The flats where we landed proved too fascinating and by night we had scarcely got out of sight of the moored boat. Another trip on the 27th, after Fogg had been obliged to return home, pleased Mr. Preble no better: we grubbed about in the tidal flats and got nowhere near the real area of wild flowers which he was intent on showing us. It was too much to expect him to appreciate all the range-extensions we were noting. *Typha latifolia* formed a dense (though sterile) stand at the border of a bog, where *Scheuchzeria palustris* var. *americana* Fern. reaches a northern limit and where the yellow-green *Sarracenia purpurea* forma *heterophylla* (Eaton) Fern. abounds. The *Typha*, Mr. Preble told us, is really abundant some miles farther north, along Baker Brook, where the fish-packers go to get their "flag." In the woods and thickets *Fraxinus nigra* and *Corylus cornuta* Marsh. (*C. rostrata*) were reaching northern outposts; and the abundant *Arceuthobium pusillum*, parasitic on *Picea mariana*, was also an extension northward. Various *Carices* were also absorbing our attention, very complex series in the *flava*- and the *stellulata*-groups. In wet swales *Myosotis laxa* and *M. scorpioides* both abounded; and one alluvial woodland had a great abundance of *Trillium cernuum*, another northern extension. To a New Englander these were, of course, a very tame lot of species; but they were significant as showing the very temperate conditions in sheltered river-estuaries, as contrasted with the arctic quality of the typical shore-vegetation on the outer coast.

The halophytes particularly absorbed us. The brackish mud-flats were carpeted with *Eleocharis parvula* (R. & S.) Link (*Scirpus nanus*), at a new northern limit; and mixed with it, and at first almost indistinguishable from it, was *E. acicularis* var. *submersa* (Hj. Nilss.) Svenson[1] of Greenland, Arctic America and Labrador, new to Newfoundland. *Carex hormathodes* abounded in the brackish shores, an extension north from Bay St. George, and with it *Juncus Gerardi*, also a northern extension. At one point there was an extensive development of *Scirpus americanus* (all sterile at this northeastern

[1] Svenson, Rhodora, xxxi. 188 (1929).

outpost); and the southern and chiefly maritime *Juncus articulatus* var. *obtusatus*, new to Newfoundland, abounded. The shallow films of salt water were filled with *Zannichellia palustris* var. *major* (Boenn.) Koch and a jumble of variations of *Ruppia maritima*,[1] the latter all growing together and clearly not individual responses to different depths and temperatures of the water: var. *obliqua* (Schur) Aschers. & Graebn., a European variety which we now know very generally about the Gulf of St. Lawrence (western Newfoundland, Miquelon, Anticosti, the lower St. Lawrence, Magdalen Islands, Prince Edward Island and Cape Breton); var. *intermedia* (Thedenius) Aschers. & Graebn., more local in eastern America (our station at the mouth of Main River and salt marshes of Rimouski Co., Quebec); and var. *brevirostris* Agardh, another variety (in Europe often treated as a species) known in America only about the Gulf of St. Lawrence (our new station, the first in Newfoundland, the "Côte Nord" of Quebec, and the Mingan Islands and the Magdalen Islands).

These and numerous other halophytes held our attention through much of our two days at the mouth of Main River; but above the saline area the broad gravelly or alluvial flats will be quite as productive. When we were there they were a splendid show of the exquisite creamy-white flowers of *Parnassia caroliniana*, the blue-purple and white of the delicate racemes of *Lobelia Kalmii*, and bright red of the fruiting racemes of *Tofieldia glutinosa*. *Juncus Dudleyi*, purplish-bronze in maturity, was a good find, in Newfoundland previously known only from the Bay of Islands; and these alluvial islands seemed to be the center of distribution of the usually rare *Carex Hostiana* var. *laurentiana* Fern. & Wieg.[2] It formed fine tussocks over a large area and with it were several tussocks of what was apparently a hybrid of it with *C. flava*. Near by, *C. flava* was also crossing with *C. Oederi* var. *pumila*. *Solidago lepida* var. *elongata* (Nutt.) Fern.,[3] the first east of Gaspé, was in the borders of thickets; and the flats were often covered with willows like those of northern Maine and northern New Brunswick: *Salix lucida* and its var. *intonsa*, *S. cordata*, *S. pellita* and *S. glaucophylloides* Fern.

We did not come within two miles of the area Mr. Preble was anxious for us to see, where "every kind of flower" grows. That,

[1] For revision of the North American varieties of *Ruppia maritima* see Fernald & Wiegand, Rhodora, xvi. 119–127, t. 110 (1914).

[2] Rhodora, xxvi. 122 (1924).

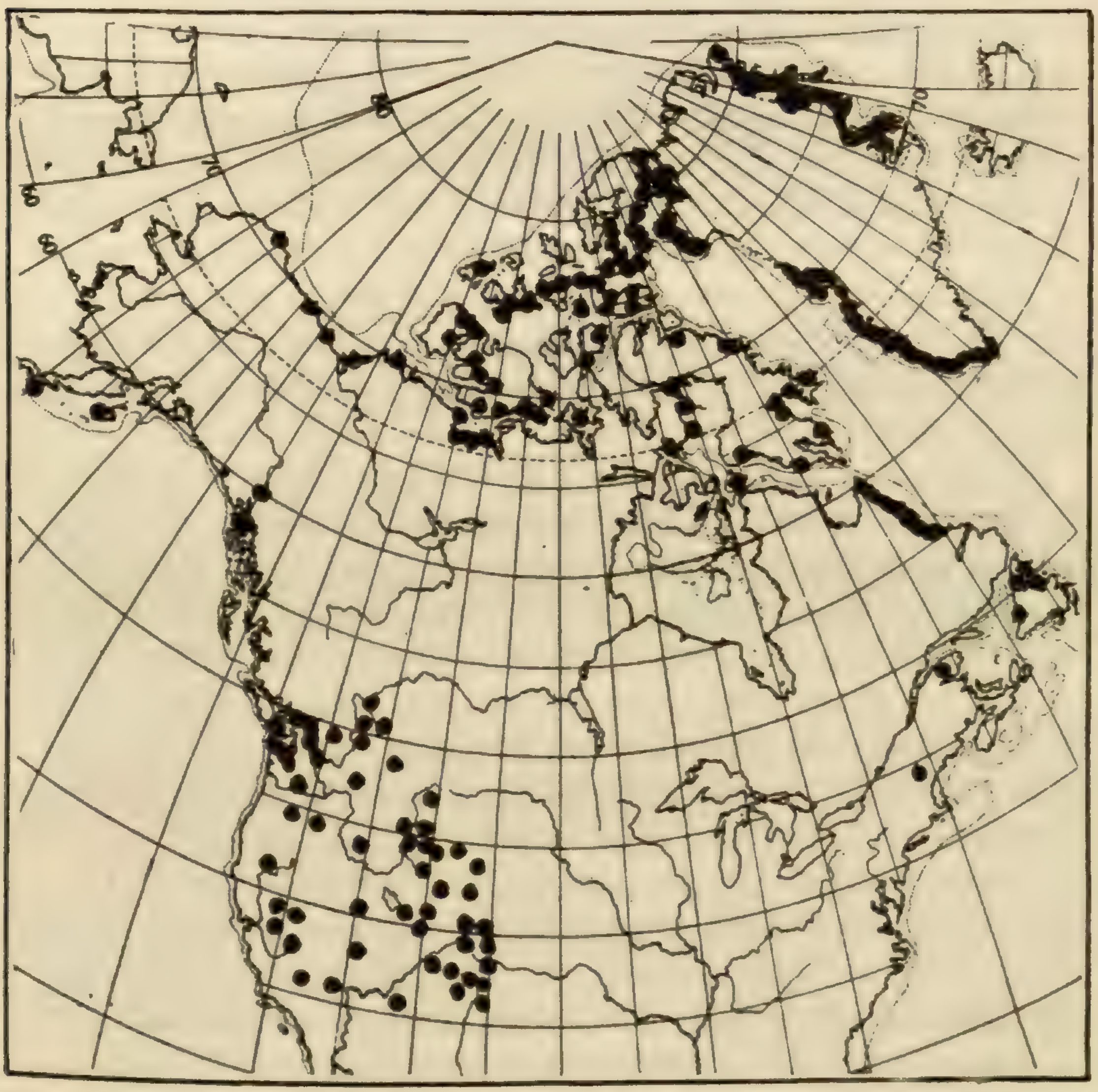
[3] Rhodora, xvii. 9 (1915).

along with many other alluring spots, must wait. A trip up Deer Brook brought a few more northward extensions of range; and another, to the mouths of Middle Brook and of McKenzie River, yielded more colonies of the estuary species, as well as *Plantago major* var. *asiatica*, new to Newfoundland. In the shallow bay at this point Eel Grass, *Zostera marina*, was very freely fruiting, the leaves of the fruiting branches much smaller than on the foliage-branches. All the material in Newfoundland and south along the Atlantic coast seems to belong to *Z. marina* var. *stenophylla* Aschers. & Graeber. Its leaves vary greatly in breadth, from 1.5–6 mm. wide (in dried plants); but they are all coriaceous and opaque, with only 3 (very rarely 5) strong nerves. Var. *stenophylla* occurs northward to southeastern Labrador, locally in southwestern Greenland, in James Bay, in the North Pacific and in northern Eurasian waters. Typical *Z. marina* seems to be the coarser plant of western European (and Mediterranean) waters, with thinner and subtransparent leaves up to 12 mm. wide, mostly with 5–7 strong nerves besides the more numerous finer ones. This larger extreme (typical *Z. marina*) has its counterpart on the Pacific coast of North America, whence it was published as *Z. marina* var. *latifolia* by Morong and as a species, *Z. pacifica*, by Watson. Whether there are good fruit-characters to separate the plants I am at present unable to say, for want of sufficient fruit of the broad-leaved plants of western Europe and of western North America. Should it eventually prove that *Z. marina* var. *stenophylla* Aschers. & Graebn. (1897) is a distinct species, it must be called, by a quite unintentional coincidence, *Z. stenophylla* Raf. Am. Mo. Mag. ii. 175 (1818).

We had originally had Trout River in our schedule; and one day, August 14th, starting from Woody Point for the region of Lomond (near the mouth of Main River), we suddenly perceived that it was absolutely calm outside. There was nothing to do, then, but make a trip southward along the outer wall and to go, while going was good, as far as possible southward along the coast. Passing under Western Head, at the southern entrance to Bonne Bay, we were attracted to the steeple-like pinnacles of diorite which stand like scattered spires (PLATE 237)[1] over the slope—mute evidence that no recent continental ice-sheet has passed over the area, with the inevitable denudation and removal of slender pinnacles. Landing under the nearest, where

[1] This half of plate 237, made from a photograph taken from a throbbing motor boat, is, necessarily, a bit vague. It, however, shows the important physiographic feature.

loose talus poured down the steep slope, we were at once, close to sea-level, in the mixture of Canadian, Hudsonian and Arctic-alpine vegetation already emphasized. Other landings, at the outer base of Western Head and, farther south, on the basalts and the shales near Wallace's Brook, showed the same conditions. Most of the arctic species had been repeatedly collected and, consequently,



Map 11. American Range of Oxyria digyna.

need be merely suggested (*Carex scirpoidea*, *Juncus trifidus*, *Silene acaulis* var. *exscapa*, *Saxifraga oppositifolia*, etc.); but it was certainly a surprise to find *Oxyria digyna* (map 11) abundant at sea-level, a species ranging south from "farthest north" (lat. 83° in Greenland and Ellesmereland), and in Gaspé and New England known only in the most alpine areas. *Luzula campestris* var. *alpina* Gaud., perhaps

better treated as a species, *L. sudetica* (Willd.) DC., was a good addition to the Newfoundland flora; and much of the *Silene acaulis* var. *exscapa* had elongate peduncles (the ordinary plant with flowers subsessile or buried in the leafy tufts). We had great hopes of this plant and collected much material in fruit. It was past flowering and when in anthesis it may prove to be of great interest. For the present we are calling it *S. acaulis* var. *exscapa*, forma *caulescens* (Vaccari) Fiori, a plant not previously recorded in America. On some of the slopes *Hedysarum alpinum*, with lingering flowers, was in fine fruit, as great a display of this elegant plant as we had ever met. *Agropyron* here, as everywhere in Newfoundland, was so perplexing that we collected much material, toward a restudy of the group; and we have a fine series of an *Oenothera* of the *biennis*-group at about its northern limit. One small pocket of *Gentiana nesophila* was all we could find, and there was not a sign of the ordinarily ubiquitous *G. Amarella* and *Halenia deflexa;* and *Euphrasia* was disconcertingly restricted in quantity.

Finally, after Fogg was obliged to leave and Long and I had made the last trips about Bonne Bay, we two sailed for Bay of Islands to connect with the Clarke boat which would sail early in September for Quebec and Montreal. Bonne Bay, which we had originally passed by in our schedule as "all worked out," had proved to be a mine of new discoveries; and we hadn't been on Gros Morne, Gallie's Head, the Peak of Teneriffe, nor the fascinating tablelands to the north, nor the spectacular mountains slightly to the south, about Trout River. Farther south, Chimney Cove, where the invalid Waghorne got choice things, was again unvisited; and we did not see the deadwaters of Main River where grow "every kind of flower." Mr. Preble tried to lure us back the next summer but, unfortunately, although his quite unnecessary bait was most tempting, further expeditions have thus far been out of the question.

Waiting for the steamer to load at Corner Brook, Long and I revisited Hannah's Head and the woodlands along the Humber, where, at the opening of the summer, we had had such "thrills." At the first of September Hannah's Head was excessively dry and no one would guess that beneath the parched crust there were tens of thousands of fine buds of *Botrychium Lunaria.* The autumn plants were on; and *Solidago canadensis*, which seems to be a very rare plant in Newfoundland, was conspicuous. *Lycopodium tristachyum*,

another species rare in Newfoundland, grew in the dry woods and well up on the open rocky slope. At our old station *Orobanche terrae-novae* was ripe, its capsules slenderly lanceolate, as contrasted with the ovoid-conic capsules of *O. uniflora* of the continent.

Early in the summer, while waiting for the "Sagona," Mr. and Mrs. Morris had discovered a turfy slope near Petrie's where most of the *Botrychia* of Newfoundland congregate, and, best of all, they had *Botrychium angustisegmentum* (Pease & Moore) Fern.,[1] a Canadio-Alleghenian species new to Newfoundland. Sunday, September 1, was very rainy, but, determined to get specimens of the latter species, we went in rain-coats and with umbrellas (for we were now packed up and in "store clothes") to the area—*B. simplex*, *angustisegmentum*, *matricariaefolium*, in several forms, and *multifidum* (Gmel.) Rupr. (*B. ternatum* var. *rutaefolium*). Not far away were *B. Lunaria* and *B. virginianum* var. *europaeum* Ångström; so that Humber Arm lacks only true *B. lanceolatum* to complete the list of known Newfoundland species.

Part II. Phytogeographic Considerations

When we left Newfoundland we had done nothing we had expected to do and had done many things we had originally planned not to do, discounted at the start as not at all worth while. Nevertheless, we were wholly gratified with the results and our collection of discriminatingly selected specialties (with most of the commonest species uncollected) amounted to nearly 7000 sheets. We had learned anew one humiliating truth: that the best-worked areas, even after weeks of exploration, still need careful study; and we had been especially impressed by three points of large phytogeographic bearing.

The least significant of the three was the complete absence in the summer of 1929 of several annual or biennial species which, in 1924 and 1925, had been everywhere abundant in appropriate habitats. In those years the open limy shores and the barrens near sea-level in northwestern Newfoundland had been brilliant with the biennial *Gentiana nesophila* Holm and *propinqua* Richardson, and the superabundant *G. Amarella*. It was then impossible to avoid stepping upon biennial *Halenia deflexa;* while annual *Euphrasia* in multitudes, both of colonies and of species, colored all turfy slopes. But in 1929 we saw not a solitary individual of *Halenia deflexa* nor of *Gentiana*

[1] Rhodora, xvii. 87 (1915).

Amarella nor *G. propinqua*. The complete absence of these plants was vividly brought home, since I had confidently promised to secure seeds of all variations of *Halenia* for Dr. Caroline Allen, who was monographing the genus. Our failure to find these usually ubiquitous biennials of the region, was, therefore, not due to two of them being on the "taboo-list." *Euphrasia*, too, was a disappointment. The alpine *E. Williamsii* prospered, but the lowland species were very meagrely represented; in fact, *E. purpurea* Reeks, var. *Farlowii* (Robinson) Fern. & Wieg., formerly one of the commonest maritime species of the West Coast, was nowhere seen, nor was *E. stricta* Host, which in the past has been abundant about outer Bonne Bay and St. John Bay; while the usually abundant *E. arctica* Lange, of the upper borders of the strand, was found as only a single small colony. Our station for the biennial *Androsace septentrionalis* on the slope of Tucker's Head yielded exactly two diminutive individuals (we took pains to scatter some seed!). On the cliff at Rivière à la Martre on the Gaspé Coast it can be secured in quantity, as also on the Mingan Islands; in other words, the species usually occurs in abundance.

This fact, that most of the annual and biennial species of the sea-level habitats in northwestern Newfoundland had nearly or quite vanished from the flora in 1929, was very impressive. Certainly we had not diminished them in 1924 and 1925, for neither we nor any other botanists had ever visited any of these special areas, except La Pylaie in 1820, when he recorded and collected not a single *Euphrasia* nor *Gentiana propinqua* nor *Androsace*, and Wiegand in 1910, who did not visit the identical spots. In writing of our visit to Lark Harbor in 1926 (p. 4) I pointed out that there had been no summer, that early in September the snow of the preceding winter remained unthawed in many places. Similarly, we were told, 1927 and 1928 were "summerless" years; 1929, with bright sunshine and some piping hot days, was heralded as the first real summer for four years. We were, apparently, witnessing one of the tragedies of boreal floras. With three successive years when the late-flowering annuals and biennials had been unable to mature seeds, these species had become, at least temporarily, almost extinct; while at least six of them seemed completely to have disappeared. Some of them (*Gentiana nesophila*, *Androsace septentrionalis* and some of the Euphrasias) had barely survived; and one of the most interesting observations to be made on

the next trip to the West Coast is going to be whether or not any or all of these handicapped species have "come back." It requires no great powers of imagination to see why in the Arctic flora annuals are essentially wanting!

The second point of phytogeographic importance concerns the antiquity of the Coastal Plain flora, characterizing the highest "alpine" and treeless tablelands, which form the peaty summit-levels of western Newfoundland, but occurring quite as abundantly on the lowland bog-barrens of southern and central Newfoundland. In discussing, in 1911, this austral or Coastal Plain element in the Newfoundland flora, accepting the then current interpretation of Pleistocene glaciation, I concluded that the Coastal Plain element in the flora and the fauna had reached Newfoundland in post-Wisconsin time from the South, by migration along the then elevated but now submerged Continental Shelf (the northern extension of the true Coastal Plain of the South). Subsequently this interpretation gained additional support by the discovery in Nova Scotia of more than 100 additional Coastal Plain species.

Fortunately, since 1911 the problem of changes along our coast has received some of the attention it deserves and which is certainly needed, if we are correctly to interpret the migrations of plants and animals between Newfoundland and New Jersey. In 1915 the brilliant investigator, the late Professor Joseph Barrell, in a study of *Factors in Movements of the Strand Line and their Results in the Pleistocene and Post-Pleistocene*,[1] enumerated various isostatic factors which must be considered, but the strongest challenge to my interpretation of 1911, that the migration was post-Wisconsin, is contained in the remarkably detailed study of *The New England-Acadian Shoreline* by Professor Douglas Johnson. Johnson's mature conclusions bear so strongly on the problem of migration of the so-called Coastal Plain element in the flora of Newfoundland that I venture to reprint:

Age of Banks Cuesta and Date of Submergence.—The interpretation of the Banks as a coastal plain cuesta receives support from the fact that in the course of their operations on the Banks fishermen bring to the surface fragments of fossiliferous sandstone and limestone. A series of these collected and described by Upham, and determined by Verrill to be of Tertiary age (probably Miocene or even Pliocene), shows that the submergence must have occurred at the end of the Tertiary or still later in post-Tertiary time; for after the deposition of the late Tertiary sedi-

[1] Barrell, Am. Journ. Sci. ser. 4, xl. 1–22 (1915).

ments we must allow time for the erosion of the lowland prior to its submergence. If the bevelled top of the cuesta is the remnant of a peneplane developed on the coastal plain beds (and perhaps also on the crystallines of the oldland), then since the deposition of the late Tertiary formations the land was uplifted, one cycle of erosion completed, another uplift occurred, and in the new cycle maturity was attained before subsidence drowned the resultant topography. Thus we should expect the subsidence to be at least post-Miocene, and more probably post-Pliocene. It should be observed that if the Banks Cuesta is composed in large part of late Tertiary deposits, it is not geologically the equivalent of the principal cuesta farther west. It is, however, quite normal for an inner lowland to be bordered by a cuesta of resistant Tertiary beds in one place, and by a cuesta of resistant Cretaceous beds elsewhere, if the cuesta maker of one locality decreases in resistance at another, or is cut out by an unconformity or otherwise, in such manner as to give at most only a minor cuesta on the inface or backslope of the new major cuesta which replaces the first, due to increased resistance of higher or lower beds in the coastal plain series.

Relation of Banks Cuesta to Former Plant Migrations.—The conclusions here reached are not without interest in connection with an important problem of plant geography. Fernald, developing and extending a conception first stated by Hollick, has shown that many species of plants characteristic of the Pine Barren and Coastal Plain floras of New Jersey and the south occur at various points along the New England and Acadian coasts, and even on Newfoundland. After examining the means by which this coastal plain flora (believed to be incapable of migrating over the oldland which now reaches clear to the sea in New England and the lands northeast) could have reached the far northern localities, he reached the conclusion that the submerged Banks off these coasts must recently have projected far enough above sealevel to give a sandy land-bridge along which the flora could spread freely. Following Daly he appealed to a lowering of sealevel during the glacial epoch to lay bare the crests of the Banks. Barrell pointed out that this would require the migration of the flora during a cold period, whereas the evidence indicates, and Fernald agrees, that such migration must have taken place when the climate was as warm as, or warmer than, that of the present; and he suggested a bulging up of the Banks zone marginal to the ice sheet while the mainland was weighed down by the ice, followed by further uplift as the ice melted and the mainland rose, with a later settling back or subsidence of the Banks as an after-effect of deglaciation.

The submarine physiography of the Gulf of Maine offers striking confirmation of the hypothesis that the Banks were formerly much higher; but it throws no clear light on Barrell's theory of an up-bulging during the glacial period. The inner lowland and cuesta represent a great work of erosion which must have been practically completed before the ice invasion. There seems to be no reason, however, for placing the plant migration so late as post-glacial time. Fernald recognizes the possibility that the plants "migrated northward on the continental shelf prior to the Wisconsin glaciation, and persisted outside the subsequently glaciated area, finally taking possession of their present isolated habitats on the receding of the ice"; and he finds evidence of the existence of "some tract along the coast, especially of Acadia and Newfoundland, which

held this flora . . . continuously through the Pleistocene." In another connection he definitely places the date of migration as "late Tertiary"; and in a letter to the author dated September 28, 1923, he writes: "In regard to the possibility of the Coastal Plain flora migrating to Nova Scotia and Newfoundland in pre-glacial times, there is absolutely no botanical reason, so far as I can see, why this might not have been the case. In fact, there are certain rather striking points which would indicate that a migration in late Tertiary or early Pleistocene times took place." Some of the points referred to in the last quotation are considered in Fernald's later contributions to the subject, published in 1918 and 1921; and his reference in the last paper to an elevation of the continental shelf "since the Pleistocene glaciation" must be read in the light of his other clear statements that the plant migration in question probably antedated the glacial period.

Whatever the later history of the region, the submarine physiography demonstrates the presence of a normal, maturely dissected coastal plain bordering the New England-Acadian oldland at a period which would account for the very early migration of the Pine Barrens flora contemplated in the foregoing quotations. There were then no such broad channels of open water as must have separated certain of the Banks on the theory of a more limited lowering of sealevel due to glaciation; while instead of a temporary land bridge due to bulging at the margin of the glacier there was a long-enduring coastal plain topography extending continuously from New Jersey and southward to beyond Newfoundland. Thus the botanical problem of migration would seem to be measurably independent of changes of sealevel due to glaciation and of marginal bulging due to crustal readjustment under the weight of the ice; although we recognize the possibility that both these factors may have played a rôle in the later history of the Banks Cuesta.[1]

Still other lines of investigation were demonstrating that this migration need not have been a recent one. Dissatisfied with the then current idea, that Newfoundland had been completely denuded by the later Pleistocene glaciations which would have wiped out its flora and fauna, I appealed in 1923 to the venerable and unchallenged student of the Pleistocene, Professor A. P. Coleman, who had already emphasized the lack of glaciation (consequently the antiquity of the relic and endemic flora and fauna) of the alpine area of the Shickshock Mts. in Gaspé. To me the Newfoundland situation seemed identical: conspicuous and unquestioned denudation of the hills in some areas (Burgeo, for instance, PLATE 233); but in others, notably the West Coast and the Long Range, a lack of wholesale denudation by an ice-sheet. In 1926 Professor Coleman published his results, from which I quote pertinent passages (with apologies for such as modesty might require my omitting, except that they demonstrate the importance of phytogeography in the geological problem):

[1] Douglas Johnson, The New England-Acadian Shoreline, 301–304 (1925). N. Y. John Wiley & Sons; London, Chapman & Hall.

All the available geological literature on the subject has been consulted . . . ; but it is interesting to note that the most important work is by an eminent botanist, ... , who, with various assistants, has studied the plants of many parts of the island and has discovered a large number of peculiar, often endemic, species which have survived the ice age. . . . . His latest paper, on the "Persistence of Plants in Unglaciated Areas of Boreal America," . . . must be taken into account by students of the Pleistocene.

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In most parts of the [Avalon] peninsula the sheet of drift is thin and does not indicate powerful ice action. It seems that the last ice was not heavy enough to depress the region by its weight, since no raised beaches have been reported around the Avalon peninsula. It was thought by Daly at one time that Signal Hill at St. Johns was submerged, but a later study of the hill convinced him that there was no change of level; and this agrees with my own observations on the coast near St. Johns, which failed to show any terraces.

The facts observed seem best accounted for by supposing an early Pleistocene ice cap covering the whole peninsula, followed by a long period of weathering, and then by small local ice sheets of Wisconsin age, which did not unite to form a complete ice cap. If the earlier and heavier ice mass depressed the region seriously any marine terraces formed during the interglacial time seem to have been obscured or destroyed; and the small local ice sheets of the Wisconsin were not sufficient to cause depression.

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[About Notre Dame Bay] The general impression was that the glaciation was ancient except along the shore of the bay at Lewisporte, where the bowlder clay was soft and fresh looking, with plenty of well-preserved striated stones. It may be that a valley glacier of Wisconsin times moved northward through the bay.

Bishop's Falls and Grand Falls, 20 or 30 miles west of Notre Dame Junction, show hard and ancient-looking bowlder clay, of deep brown color, in which striated bowlders are not infrequent. Exposed ridges of sandstone rise above the till, sometimes as jagged edges which have been deeply eaten by weathering.

To the north of Bishop's Falls great kame deposits indicate a prolonged halt of the ice sheet, and near the harbor of Botwood there are rolling hills of gravel and a few shallow kettles. At the shore of the bay the only evidence of ice action consists of a few bowlders scattered over hills of rhyolite penetrating slaty sandstone of a reddish color. Apparently little work was done by the ice beyond the morainic deposits.

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The Topsails, about 35 miles farther west, are interesting as hills rising above the highest tableland crossed by the railway, which reaches 1,550 feet a few miles east of Gafftopsail Station. The general character of the tableland does not suggest glaciation, since it is a plain covered with great bowlders of granite and gneiss, just like the underlying bed rock which shows as low bare ridges in places but is usually hidden by coarse and fine granitic débris which seems to have originated in place.

A few striated stones were observed near Gafftopsail Station, but no bowlder clay, only sandy and gritty material. At one place along the railway east of the Station a surface of porphyrite is apparently faintly striated in a north-and-south direction. Gafftopsail Mountain, reaching over 1,700 feet, consists of granite, and a few rounded bowlders of greenstone are scattered over it, showing that it was crossed by ice, though the rough and weathered surface does not suggest glaciation.

The highest point, a few miles northeast, is Maintopsail (1,829 feet). It also consists of coarse, greatly weathered granite, on which rest a few greenstone pebbles and bowlders which must have been transported by ice. There are several small shallow pools on the summit, probably due to differential weathering, with a gritty sand of angular quartz and feldspar on the bottom. The country all around the mountain is strewn with granite bowlders, among which are innumerable pools and ponds of the same kind as on top, sometimes, however, reaching the size of lakes.

The greatly weathered surface of the mountains and of the tableland a few hundred feet beneath suggests that the glaciation was very ancient, probably of Kansan or Jerseyan age; and nothing was seen to indicate a Wisconsin ice sheet.

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The northwestern side of the [Long] range is much more accessible both by rail and by water and was studied at four points. The first visits were made in 1923 at the suggestion of Dr. Fernald, who had found endemic plants on the range, demanding a much greater lapse of time than the 25,000 or 30,000 years since the Wisconsin glaciation. He had also noted that the surface of the tableland was covered with loose blocks of the underlying bed rock and closely resembled the tablelands of Gaspé and of the Torngats of Northeastern Labrador, which had never been glaciated. His photographs decidedly supported this relationship.

Late in August a climb was made on a tolt, an outlier of the range, which had been used as a hydrographic signal station. It was found by aneroid to be 1,050 feet high, about the level of the edge of Table Mountain, which forms the southwestern end of the Long Range near Cape Ray.

No glacial material was observed on the upper part of the tolt, and its summit consists of loose blocks of granite and gneiss of the same kind as the underlying bed rock. There was no evidence that ice had ever crossed the summit, but the deep U-shaped gorge which separates it from the main range appears to have been carved by a valley glacier.

On the last day of August an ascent was made at Tompkins, 9 miles northeast of the tolt. No signs of glaciation were seen above the edge of the escarpment at 970 feet (aneroid), and a walk of 4 or 5 miles inland over the rolling surface of the table land, reaching 1,908 feet (aneroid), showed only angular blocks of Archaean rock of local origin. No foreign bowlders were found, and the conclusion was reached that the southern part of the Long Range had never been glaciated.

Another ascent made in 1925 at about the same point gave similar results. Angular fragments of Archaean rocks, schists, serpentines, etc., were seen everywhere, but no granites or gneisses which might have come from other parts of the range, and no red sandstones or conglomerates such as ice moving from the Gulf of St. Lawrence must have transported from the plains below.

Another point examined was the table mountain near Port a Port, 20 miles west of Stephenville Crossing on the railway, where Dr. Fernald had reported an unglaciated surface of limestone. Bowlder clay was found up to about 500 feet, but above this there was only bare limestone, and the nearly flat surface at about 1,000 feet (aneroid) was covered with loose fragments of the same rock. At first it seemed that the table had never been ice-covered; but the finding of a few scattered greenstones and granites, much rounded and old-looking, proved that there had been glaciation in the early Pleistocene, though it had escaped ice action in the latest or Wisconsin refrigeration.

Blomidon, appropriately called "Blow-Me-Down" by the local inhabitants as noted by Fernald, 35 miles northeast of Port a Port, at the mouth of the Bay of Islands, consists of serpentine and associated basic rocks. Up to about 1,000 feet red clay with granite or gneiss bowlders was found. Above this a few fragments or small bowlders of granite occur on the weathered surface of serpentine or diorite as for as 1,560 feet. From this to the highest point reached (1,700 feet) only fragments of serpentine or other basic eruptives which might be of local origin were seen, and there was no evidence of glaciation.

Work was done at Bonne Bay, also, about 40 miles farther to the northeast, in the region so well described by Twenhofel, who reported striae on the top of the Bonne Bay table mountain (2,336 feet). His account of the mountain [otherwise] makes it a typical example of an unglaciated serpentine tableland, its surface covered with weathered fragments of the underlying bed rock, and one wonders if there has not been some error in mentioning striated surfaces under those conditions.

Two mountains were climbed near Bonne Bay, one southwest of the village, the other the Gros Morne, some miles to the northeast. The first mountain reaches only 1,263 feet (aneroid), and a few bowlders of granite and of conglomerate occur all the way to the top, proving that it was crossed by ice. The glaciation seems very ancient and weathering has destroyed all evidence of ice action except the rounded bowlders mentioned.

The Gros Morne (2,540) is believed by the people of Bonne Bay to be the highest mountain in Newfoundland. Its gently rolling summit is a tableland of quartzite covered with angular slabs of the same material. A few rounded, much-weathered, bowlders of granite were seen almost to the top, suggesting ancient glaciation; but here, as on other parts of the Long Range, the ice sheet must have disappeared long before Wisconsin times.

The Gros Morne is about midway in the Long Range, and no climbs were made farther northeast, though the narrow, somewhat broken tableland as seen from coasting steamers has the same appearance as the part examined.

Fortunately Dr. Fernald, who covered the region from St. John Bay to Cape Bauld on a botanical investigation in the summer of 1925, has a keen eye for terrain and has sent me photographs and a written description of this northern part of the Long Range, which may be used to complete the account of this little-visited part of Newfoundland.

His observations indicate only slight glaciation, if any, and the photographs show the tablelands, and even some of the lower plains, to be

covered with loose and more or less angular blocks, which could not have been left if there had been Wisconsin glaciation.

. . . . . .

In the foregoing paper it has been shown that there is evidence in Newfoundland of early Pleistocene glaciation by ice caps which covered all of the island except the southern part of the Long Range, which seems to have remained as an area free from ice on which preglacial plants could survive. It is probable that the Newfoundland ice was really the margin of the Labrador sheet which more or less completely filled the Gulf of St. Lawrence and expanded over all but the highest tableland of the southern part of the island. The retreat of the early ice sheet, which was probably of Kansan or Jerseyan age, was followed by great emergence of the land, especially toward the north.

The effects of the early glaciation have been greatly obscured by later processes, and the ancient glaciated surface is in most places covered with débris and fragments of the underlying rock resulting from long-continued weathering. As a rule the only evidence of the early ice sheets is to be found in rounded erratics of foreign origin lingering unconsumed among the blocks of local origin. Probably hundreds of thousands of years elapsed after the early glaciation before the still fresh bowlder clay and striated surfaces were formed by the less extensive Wisconsin ice sheets.

In one place, at Curling on the Bay of Islands, interglacial materials containing marine shells have been found between two bowlder clays; but elsewhere the time interval is shown only by the profound weathering undergone by the older materials.

The Wisconsin ice probably covered less than half the island and was in the form of small separate sheets or valley glaciers. No proofs of its work have been found above 1,000 feet; and Dr. Fernald has shown that the ice-free tablelands made refuges for plants, so that many cordilleran species and more than eighty related endemic species, developed during the long interglacial period, still survive there.

There is good reason to believe that the southeastern parts of Labrador, as well as the Torngat tableland in the northeast, were not reached by the Labrador ice sheet in the Wisconsin refrigeration, which was much less severe than the earlier one, from which it was separated by a long interglacial time of milder conditions.

In the western part of the island changes of sea-level followed each of the glaciations, corresponding in amount to the thickness of the ice removed and in accord with the theory of isostasy.

The causes of the movements of sea-level in the region have been ably discussed by Daly in "Postglacial Warping of Newfoundland and Nova Scotia," and it is not necessary to take up that very interesting subject here.

The conclusions reached in regard to the glaciation of Labrador and Newfoundland throw light also on the interpretation of Pleistocene events in Nova Scotia, separated from the island only by Cabot Strait.

Goldthwait, in his excellent and very readable "Physiography of Nova Scotia," describes the glacial features of the province and suggests that there is no clear evidence of a recurrence of ice sheets during the glacial period. He has so thoroughly studied the Pleistocene of Nova Scotia

and has so well described the work of ice in that area that one hesitates to oppose his views; but one can hardly help the conclusion that his account of the surface features of the tablelands of Cape Breton Island accords much better with the theory of two glaciations than with a single glaciation, if indeed the higher parts were ever glaciated at all. He described the granite surface as cracked into angular blocks and crumbling into sharp-edged grains of sand; and there are no foreign bowlders found among the weathered débris. There are no striated surfaces on the tableland itself, though striae occur on lower ground near by.

Visits paid by myself to the Mabou tableland near Inverness and to Ingonish Mountain left a strong impression that these elevated regions had never been ice-covered. If ice ever crossed them it must have done so in a very early stage of the Pleistocene.

Fresh bowlder clay with many striated stones can be seen up to about 500 feet on Mabou Mountain, making a striking contrast with the surface above this, where there are loose blocks in place and no sign of ice work was observed. There is an even stronger contrast between the tableland at Ingonish, without a hint of glaciation, and the features of North Sydney, where one finds till with many striated stones and also well-striated surfaces of sandstone under bowlder clay along the railway a mile or two in the direction of Sydney.

The latter features are so fresh that they must be considered Wisconsin; while, if the tableland was ever ice-covered, it must have been at the very beginning of the Pleistocene, so that its effects have been removed by long-continued weathering.

This view is supported by Dr. Fernald's botanical researches, since he finds that some of the cordilleran plants observed in Gaspé and the Long Range occur also on northern Cape Breton Island. It appears, therefore, that all the highlands surrounding the Gulf of St. Lawrence, whether in Gaspé, Cape Breton, or Newfoundland, escaped the Wisconsin glaciation entirely, and in parts were not invaded even by the more extensive ice sheet of the early Pleistocene. They were nunataks not covered by the ice, and served as refuges for species of plants which were destroyed by the Wisconsin glaciation on lower ground. The botanical evidence that plant growth was little, or not at all, interrupted on the high tablelands during the ice age strongly confirms the conclusions reached by a study of the Pleistocene as described in the foregoing paper.

Up to the present there has been very little evidence to show that Eastern North America was invaded more than once by ice. On Long Island the Wisconsin drift sheet rests on two older ones, as noted by Goldthwait; and in New Jersey a very old sheet of till has been recognized; but no general and complete removal of the ice with an important interglacial time has been suggested. The evidence of two glaciations of Newfoundland and Labrador, separated by a long period of weathering, brings the Pleistocene history of the Gulf of St. Lawrence region into line with that of central Ontario, the states of the Mississippi Valley, and the cordilleran region of British Columbia, Washington, and Montana. It is evident that the so-called "ice age" was interrupted at least once by a removal of the ice sheets from the whole of North America; and it is probable that this long and warm interglacial period was world-wide.

The age of the early glaciation cannot be positively determined, since the only interglacial fossils found are Marine shells of still living species,

which are not known from other interglacial deposits. Since the earlier drift sheet is profoundly weathered, a long time of exposure must have separated it from the fresh tills of the Wisconsin; and it has been assumed that the early glacial features correspond to the Kansan or Jerseyan glaciation.[1]

This newer interpretation, that the tablelands of Newfoundland were either unscathed in the Pleistocene or were crossed only in the earliest (Kansan or Jerseyan) stage and not by a Wisconsin sheet, at once opens the way for a closer correlation of the Coastal Plain plant-migration with the demands of Douglas Johnson's conclusions regarding the depression of the banks: that they were depressed in late Tertiary or earliest Pleistocene, not in post-Wisconsin time. Instead of *Schizaea pusilla* (MAP 7) and its associates coming north to Newfoundland from New Jersey in post-Wisconsin, it now seems reasonable to visualize them either as living in Newfoundland throughout the Pleistocene or as having reached Newfoundland in pre-Wisconsin time either from the North or from the South.

Stimulated by the actual field (rather than merely desk-chair) studies of Coleman and of Johnson, I was, naturally, greatly impressed by the prevalence in western Newfoundland of the Coastal Plain types on the highest tablelands, where, theoretically, one would look only for boreal species; and, following the subject further, it soon became apparent that these high tablelands have long been (perhaps as far back as the Cretaceous or even the Permian) centers from which the austral element in the Newfoundland flora has radiated to the younger boggy areas of the Island, which were under early Pleistocene (Kansan?) or later Pleistocene (Wisconsin) ice. Happily, while this newer interpretation was in the process of "unconscious cerebration," I was invited to develop for an hour some theme in phytogeography before the Fifth International Botanical Congress, at Cambridge University; and, inevitably, I spoke upon the subject which was then uppermost in my mind. It is not necessary here to repeat the exposition which was published in full in RHODORA,[2] but certain points which especially concern Newfoundland may be emphasized.

The most distinctive elements of the Atlantic Coastal Plain flora of North America are members of groups which, today, are otherwise

[1] Extracts from A. P. Coleman: *The Pleistocene of Newfoundland*, Journ. Geol. xxxiv. 193–223 (1926).

[2] *Specific Segregations and Identities in some Floras of Eastern North America and the Old World*, RHODORA, xxxiii. 25–63 (1931).—Contrib. Gray Herb. xciii., especially pp. 33 et seq.

chiefly confined to the Tropics or to the Southern Hemisphere, including Australia (the *Xyridaceae*,[1] *Diospyros*, the *Halorrhageae*, *Lycopodium carolinianum*, the *Burmanniaceae*, *Drosera*, excluding a few boreal species of § *Rossolis*, etc.); some with great development in the Malayan or the Australian region (or both) but highly localized or wanting in Africa (*Schizaea*, the *Haemadoraceae*, the *Conostylideae*, *Nyssa*); to which, of course, many others could be added. In the Cretaceous (or even in the Carboniferous, in case of some of the Cryptogams) members of the *Schizaeaceae*, *Diospyros* and *Nyssa* (to say nothing of ubiquitous *Lycopodium*) abounded in the Arctic. Thence they spread southward until, due to many Tertiary and later vicissitudes in Eurasia, they were isolated in the Malayan and Australian (and sometimes the tropical or southern African) regions. With Australia severed from its northern connection in the Cretaceous, it is obvious that the eastern American remnants of these and associated groups are very ancient. The great tablelands of Newfoundland are the counterparts of the high Appalachian tablelands of continental North America, the uplifted Cretaceous Peneplane, which, worn down by long erosion-cycles, had, at the opening of Cretaceous time, been reduced essentially to sea-level, where it formed a low plain with sluggish drainage (like the present but geologically youthful Coastal Plain), with Cretaceous seas bounding it to the East, South and West. Only at the North did the baselevelled Appalachian core have a land-connection. That was when the vast northern lands, Laurentia, Baltica and Angara, formed the greater land-mass of the world, with the smaller Amazonia, Ethiopia, Lemuria and Australia separated from the northern continent by extensive seas. Briefly, then, the thesis developed at Cambridge, based largely upon the Newfoundland observations of 1926 and 1929, was, that the baselevelled Appalachian land received the southward-moving plants and that, as the late Cretaceous and Tertiary uplifts carried the Peneplane higher and higher, many species of the primitive sandy and peaty or aquatic habitats died out or found a younger haven in the sands, peats and sluggish waters of the newer Coastal Plain or in the sands, peats and pools which resulted from Pleistocene glaciation. By this newer interpretation, therefore, it is possible to coördinate the presence of these austral types on the uplifted Cretaceous Peneplane of Newfoundland with the findings of Coleman, that on some

[1] Maps of the world-ranges of the groups here noted will be found in the paper above cited.

of the tablelands of western Newfoundland, such as that of Blomidon, "there was no evidence of glaciation," and with the probability pointed out by Johnson, that, instead of being very recent, the submergence of the continental shelf was "at least post-Miocene, and more probably post-Pliocene." The exact time of interchange along the now submerged Tertiary shelf is still not quite clear; that it could have been as early as late-Tertiary now seems fairly settled, though it is as likely to have been in post-Kansan, in the long interglacial epoch (of hundreds of thousands of years) prior to the comparatively trivial Wisconsin glaciation.[1]

[1] This newer interpretation received strong support from evidence accumulated in the summer of 1932 in Nova Scotia, evidence so far outside the scope of the present paper that it must be considered elsewhere.

(*To be continued*)

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 107*)

Contrasted with the amazingly temperate flora of the peaty tablelands of western Newfoundland, where groups with pronounced austral affinities prevail, there is the abundance at or close to sea-level on the bleak outer coast of western Newfoundland of the arctic and arctic-alpine species. On the exposed coast between latitudes 52° and 48°, from Cape Norman to Cape St. George (and in some cases even southward to Cape Ray), the following members of the flora of the American Arctic Archipelago or of Arctic Greenland (well within the Arctic Circle) occur at or within 100 m. of sea-level. Their latitudinal limits of range on the Atlantic slope of America, as closely as can be determined from the data at hand, is approximately given (omitting fractions of degrees):

Woodsia glabella R. Br. (83°–42°), *Asplenium viride* Huds. (82°–43°), *Festuca brachyphylla* Schultes (82°–44°), *F. vivipara* (L.) Sm. (75°–48°), *F. rubra* var. *arenaria* (Osbeck) Fries (70°–49°), *Poa alpina* L. (76°–47°), *Calamagrostis canadensis* var. *Langsdorfi* (Link) Inman (71°–44°), *C. neglecta* (Ehrh.) Gaertn., Meyer & Scherb. (76°–44°), *Alopecurus aequalis* var. *natans* (Wahlenb.) Fern. (71°–51°), *Hierochloe alpina* (Lilj.) R. & S. (83°–44°), *Eriophorum Scheuchzeri* Hoppe (83°–51°), *Kobresia simpliciuscula* (Wahlenb.) Mackenz. (81°–48°), *Carex capitata* (76°–44°), *C. incurva* Light. (82°–51°), *C. bipartita* All. (76°–49°), *C. glareosa* Wahlenb. (80°–47°), *C. rupestris* All. (81°–48°), *C. scirpoidea* Michx. (76°–43°), *C. glacialis* Mackenz. (79°–48°), *C. bicolor* All. (71°–50°), *C. capillaris* L. (80°–44°), *C. rariflora* (Wahlenb.) Sm. (76°–46°), *C. alpina* Swartz (76°–49°), *C. concolor* R. Br. (81°–44°), *C. microglochin* Wahlenb. (72°–50°), *Juncus trifidus* L. (72°–43°), *J. albescens* (Lange) Fern. (81°–48°), *Luzula spicata* (L.) DC. (76°–44°), *L. campestris* var. *alpina* Gaudin (70°–49°), *Tofieldia minima* (Hill) Druce (76°–48°), *Habenaria straminea* Fern. (69°–51°), *Salix reticulata* L. (73°–51°), *S. arctophila* Cockerell (77°–48°), *Oxyria digyna* (L.) Hill (83°–44°), *Polygonum viviparum* L. (83°–44°), *Arenaria verna* var. *pubescens* (C. & S.) Fern. (83°–44°), *A. cylindrocarpa* Fern. (80°–49°), *Cerastium alpinum* L. (83°–51°), *Lychnis alpina* L. (76°–48°), *Silene acaulis* var. *exscapa* (All.) DC. (83°–44°), *Ranunculus hyperboreus* Rottb. (83°–50°), *R. pedatifidus* var. *leiocarpus* (Trautv.) Fern. (80°–51°), *Thalictrum alpinum* L. (73°–48°), *Cochlearia groenlandica* (83°–51°), *Cardamine pratensis* var. *angustifolia* Hook. (81°–50°), *Draba nivalis* Lilj. (83°–49°), *D. incana* L. (70°–47°), *D. hirta* L. (81°–48°), *D. rupestris* R.

Br. (76°–47°), *Arabis alpina* L. (76°–48°), *Saxifraga cespitosa* L. (83°–48°), *S. aizoides* L. (78°–44°), *S. Aizoon* Jacq. (76°–44°), *S. oppositifolia* L. (85°–44°), *Potentilla nivea* L. (83°–48°), *P. alpestris* Hall. f. (74°–48°), *Dryas integrifolia* Vahl (83°–48°), *Astragalus alpinus* L. (73°–49°), *Epilobium latifolium* L. (83°–48°), *E. lactiflorum* Haussk. (71°–44°), *E. alpinum* L. (73°–46°), *E. Hornemanni* Reichenb. (70°–44°), *Rhododendron lapponicum* (L.) Wahlenb. (81°–44°), *Loiseleuria procumbens* (L.) Desv. (74°–44°), *Arctostaphylos alpina* (L.) Spreng. (76°–44°), *Vaccinium uliginosum* var. *alpinum* Bigel. (81°–44°), *Diapensia lapponica* L. (82°–44°), *Statice labradorica* var. *submutica* Blake (78°–49°), *Euphrasia arctica* Lange (76°–48°), *Bartsia alpina* L. (76°–51°), *Pedicularis flammea* L. (81°–49°), *Gnaphalium norvegicum* Gunn. (72°–49°), *Artemisia borealis* Pall. (76°–48°), *Taraxacum phymatocarpum* (83°–51°) and *Crepis nana* Hook. (70°–51°).

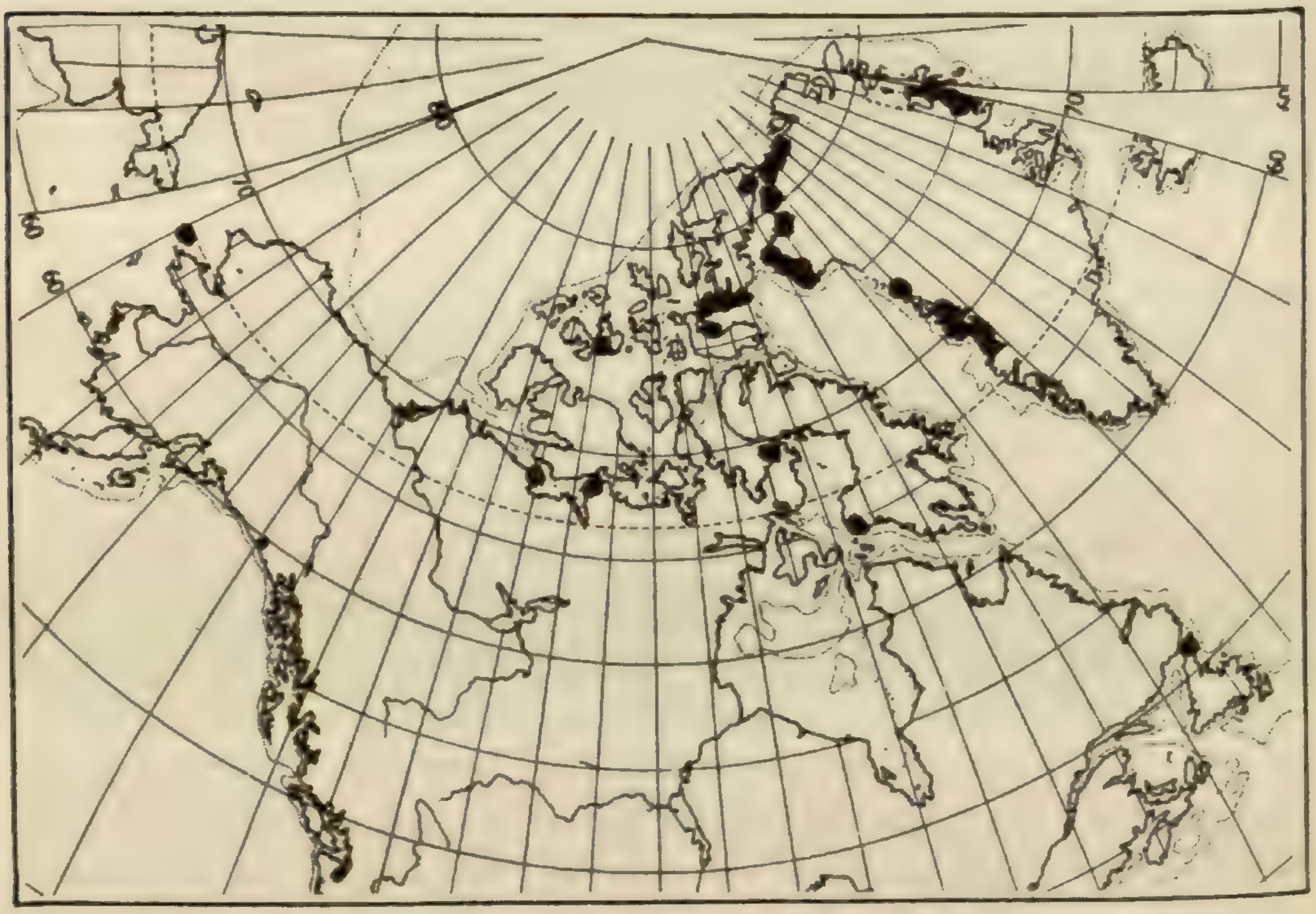
That is a highly impressive list for sea-level between latitudes 52° and 48°, and, were I to include species like *Lycopodium Selago*, *Scirpus cespitosus* var. *callosus* Bigel., *Stellaria humifusa*, *Sedum roseum*, *Empetrum nigrum* and others which reach the New England coast, it would be greatly extended (to 49½ percent of the entire flora of the Archipelago, as enumerated by Simmons). Nor does this arctic flora extend continuously from arctic Greenland or Ellesmereland to western Newfoundland *via* the coast of Labrador. A large proportion of the species are quite unknown on "the Labrador" from Nain (approximately lat. 56°) southward and one or two are not even known from the mountain walls and crests of northernmost Labrador (the Kiglapaits and the Torngats): for example *Taraxacum phymatocarpum* (MAP 12). In describing a dramatic day in 1925 on Burnt Cape (Pistolet Bay), where we first found the Greenland *Habenaria straminea* (unknown between Greenland and northern Newfoundland), I wrote: "When the scattered members of the party assembled at the crest [alt. 223 ft. or 65 m.] . . . I was picking from the crevices a *Taraxacum* which, in its small blackish involucres, was unlike anything we had seen before."[1] I made it out to be the hyparctic *T. phymatocarpum*, known, as stated by Simmons, only in "Northern Greenland, Ellesmereland," but subsequently found southward to lat. 67° in Greenland and lat. 64° on Baffin Island.

Distrusting my own identification, for the species is not known on Labrador, and in northwestern Newfoundland it is within only 223 feet (65 m.) of the sea, I divided the scanty material and sent some to my friend, Dr. Handel-Mazzetti, at Vienna, whose *Monographie der*

[1] RHODORA, XXVIII. 103 (1926).

Gattung Taraxacum (1907) had put the genus in order. His reply was wholly corroborative and when, later, I sent a series to the great Stockholm specialist, Dr. Dahlstedt, I also received a similar reply, Dahlstedt referring "No. 29254 ad *T. phymatocarpum* Vahl, verum."[1]

The contrast, then, between the bleak and rocky coastal rim and foreland of western Newfoundland and the peaty tablelands is complete. At both levels the ubiquitous Hudsonian and Canadian types form a generalized background: a forest or scrub of *Picea*



Map 12. American Range of Taraxacum phymatocarpum.

mariana and *P. glauca* Voss, *Abies balsamea, Larix laricina, Betula papyrifera* and smaller species, *Pyrus* § *Sorbus* and *Populus tacamahacca*, with *Alnus crispa* (or its var. *mollis*), *Salix* (many species), *Ribes glandulosum, Viburnum pauciflorum, Potentilla fruticosa, Lonicera villosa*, etc., with the usual Canadian filicoid and herbaceous

[1] The western Newfoundland and Gaspé collections contain much *Taraxacum lapponicum* Kihlm. In view of the present interpretation of the antiquity of the flora of these areas it was reassuring that Dr. Dahlstedt should write (*in lit.* November 14, 1927): "It has been very interesting to find that *T. lapponicum* (= *T. croceum* Dt.) is distributed also in arctic North America. This collective species . . . is widely distributed in northern and alpine parts of Fennoskandia and occurs also on Iceland and Greenland. It seems to me to be a very old species which surely inhabited the recently covered countries long before the last Skandinavian glaciation."

undergrowth; and the usual Canadian bog plants, with the addition of the almost ubiquitous *Betula Michauxii*, the superabundant *Sanguisorba canadensis* and the usually common *Eriophorum spissum* var. *erubescens* Fern. With this very generalized element almost everywhere, the truly distinctive floras are likely at first to remain masked to the uninitiated; but, once the common run of generally distributed and aggressive species is dismissed from consideration, the flora of the West Coast otherwise quickly segregates into the two contrasted elements which I have sufficiently emphasized: the arctic-alpine dominant at sea-level, the austral dominant on peaty summit-tablelands. The absence or great rarity of many, and often of all, of the Coastal Plain plants at low altitudes from Cape St. George northward is due, presumably, to the extensive calcareous area which makes up most of the lower levels and to the highly magnesian rock of portions of the Lewis Hills and Blomidon and between the North Arm (of Bay of Islands) and Bonne Bay, these furnishing soils toxic, or at least uninviting, to most of the Coastal Plain species. Farther inland and southward, where granitic, gneissic and other silicious rocks prevail, the plants of the acid peats of the tablelands have found welcoming conditions at lower levels, southward even at sea-level.

In an earlier paper, commenting on the close proximity, in some areas, of the arctic and the austral elements in the flora, I said: "In western Newfoundland, similarly, it is quite possible to stand on rock-barrens carpeted with the arctic xerophytes . . . and, by stepping a few feet into the adjacent bogs, meadows, brooksides or thickets, to find one's self in the midst of . . . plants of temperate or even austral range. . . . This intimate commingling of southern species (even Carolinian in some instances) with plants which characterize the Arctic seems, in Newfoundland at least, to be due to the differences of habitat which the two series affect. The arctic types prevail on the dry rocks or on windswept crests, *i. e.* they are primarily controlled in their southern distribution by aridity and bleakness, the climatic features most obviously distinguishing the unglaciated Arctic areas. In describing the climate of the Arctic [American] Archipelago, which, as we have seen, is essentially unglaciated, Simmons says, 'The most prominent and important factor I take its extreme dryness to be,' and this is certainly the most prominent factor in the isolated southern habitats of the arctic plants.

But in Newfoundland, bogs, wet thickets, brooksides and meadows are characterized by southern types and it is in such favorable habitats that all notable extensions [northward] of southern species occur.'"[1]

Still later, in corroboration of Simmons's statement, that on the American Arctic Archipelago, "The most prominent and important factor I take its extreme dryness to be,"[2] I quoted from Stefansson's *The Friendly Arctic*, Chap. II: "Most of what little snow falls in the far North is soon swept by the wind into the gullies and into the lee of the hills, so that from seventy-five to ninety per cent. of the surface of arctic land is comparatively free from snow at all seasons . . . . a pebble the size of a plum lying on the ground would have more than an even chance of being partly visible above the snow"; and I further wrote: "If a purely botanical demonstration of the rarity rather than the abundance of lakes and swamps [on the unglaciated Arctic Archipelago] were needed an alert phytogeographer would quickly detect it in the absence of freshwater hydrophytes. Simmons admits 204 species of vascular plants to the flora of the Arctic Archipelago, mostly extreme xerophytes, with no true hydrophytes: no species of *Isoëtes*, *Sparganium*, *Potamogeton*, *Callitriche*, *Myriophyllum* or *Utricularia*. Similarly, all these groups of aquatics were quite unmentioned either in the detailed lists of the floras of arctic Siberia and the Asiatic side of Bering Straits published by Kjellman or in Lynge's very exhaustive study of the Flora of Nova Zembla, an arctic land which was untouched by the different advances of the continental ice-sheets of Europe. But in glaciated Greenland they all occur, there extending northward on the abundantly watered foreland to points varying for the different species from lat. 68° to 72°. Furthermore, the boreal members of the great genus *Epilobium* (excluding § *Chamaenerium*) are typically plants of wet habitats; and, if the Arctic in general were as wet as Campbell and his outgrown sources of information make out, we should expect these wind-dispersed Epilobiums to be everywhere in the Arctic. In wet Greenland they do occur, extending north to lat. 73°, but the Nordenskiöld expedition got none of them on the arctic coast of Siberia (lat. 66°–77°) and Simmons could muster only a single doubtful record for the entire Arctic Archipelago."[3]

[1] Fernald, Mem. Am. Acad. xv. 332 (1925).

[2] Herman G. Simmons, *A Survey of the Phytogeography of the Arctic Archipelago*, Lunds Univ. Årsskr. n. f. Afd. 2, Bd. 9, Nr. 19: 30 (1913).

[3] Fernald, *Campbell's Outline of Plant Geography* (Review), Ecology, vii. 513 (1926)

NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, SOLIDAGO MACROPHYLLA; FIG. 2, SENECIO PAUPERCULUS; FIG. 3, SAXIFRAGA OPPOSITIFOLIA; FIG. 4, S. CESPITOSA; FIG. 5, DRABA INCANA.

With the exception of three positive hydrophytes (*Alopecurus aequalis* var. *natans*, *Eriophorum Scheuchzeri* and *Ranunculus hyperboreus*) and a few plants of damp pockets, meadows or shores (*Calamagrostis*, *Carex glareosa*, *bicolor*, *rariflora* and *microglochin*, *Juncus albescens*, *Habenaria straminea*, *Thalictrum alpinum*, *Cardamine*, *Epilobium lactiflorum*, *Bartsia alpina*, etc.), mostly plants of Greenland rather than of the Arctic Archipelago, the truly Arctic species (and their endemic relatives) in Newfoundland are chiefly xerophytes and they are all plants of open and exposed habitats. No better illustrations of the arid condition of this outer coast can be given than the limestone barrens about Old Port au Choix or on Pointe Riche. The vast extent and depth of the long-weathered and superficially arid debris is beautifully exhibited on near-by St. John's Island (PLATE 235).[1]

The coast of western Newfoundland, although fringed late into the spring with ice, which in winter has extended into the Gulf of St. Lawrence or across the Straits of Belle Isle, is not sufficiently cold to be comparable with the true Arctic; and it is decidedly warmer than the north side of the Straits and the outer coast of Labrador, where the south-flowing Labrador current carries icebergs and drift-ice far into the summer. It would seem, then, that the persistence of so extensive an element of the Arctic flora along the outer coast of western Newfoundland is due more to the aridity and the calcareous nature of the exposed ledges and the deep mantle of weathered debris than to low temperature; and that the flora of the rock barrens of the coast of western Newfoundland is largely composed of Arctic species because on these barrens are found arid conditions and calcareous soils comparable with those of much of the Arctic Archipelago where, as Simmons and others before him have pointed out, aridity is "the most prominent and important factor." Since the long-weathered superficial soils have, by continuous leaching, lost much of their alkalinity and have developed carpets of ancient acid peats, oxylophytes, such as *Hierochloe alpina*, *Carex concolor*, *Juncus trifidus*, *Salix Uva-ursi*, *Potentilla tridentata*, *Empetrum nigrum*, *Loiseleuria procumbens* and *Diapensia lapponica*, are not excluded. They, also, are xerophytes and unless the weathered and leached limestones were arid we should scarcely look for them there.

[1] Other illustrations of this arid mantle at sea-level are in RHODORA, XXVIII. t. 153, fig. 2 and t. 154, fig. 3 (1926).

The excessive dwarfing and crowding of internodes, as well as reduction of leaves and increase of blanket-coats of trichomes or other xerophytic modifications of high-arctic and high-alpine plants are familiar to every one. In eastern America it is quite unnecessary, however, to go either to the Arctic or to the alpine summits to get the most beautiful illustrations of such nanism. At sea-level in western Newfoundland (in the latitudes of London, Paris, Berlin, Vienna, Winnipeg, Duluth and Vancouver) the arid limestone gravels supply endless fascinating illustrations (PLATES 239 and 240). *Solidago macrophylla*, the woodland species of southern Canada and the mountain woods of the northern states, where it attains a height of a meter or more, wandering out to the dry barrens of Newfoundland, will flower when only 3 cm. high (PLATE 239, FIG. 1). *Senecio pauperculus*, in New England and Pennsylvania often 5 or 6 dm. high and with 15–20 heads, is the tiniest of dwarfs (PLATE 239, FIG. 2) on far-from-rich Pointe Riche. *Saxifraga oppositifolia*, which, on the damp walls of the Green Mts., may trail as broad carpets, with internodes up to 1 cm. long and flower-stalks twice as long, on these arid barrens has densely crowded leaves and sessile flowers (PLATE 239, FIG. 3). On cool and damp walls in western Newfoundland and eastern Quebec *Saxifraga cespitosa* L. often has its tufts (cespites) of leaves lax and elongate (up to 1 dm. long), with the thin and fan-like leaves 2 cm. or more long, with scapes up to 2 dm. high. Not so on the extremest of arid sea-shore barrens of Newfoundland (as at Plum Point) where the mats (PLATE 239, FIG. 4) are positively absurd in their condensation. Willows and birches, which in damp and sheltered thickets reach heights of 1–3 m., on these barrens are absolutely prostrate, with stout and ancient matted trunks and marvellously reduced foliage. *Potentilla fruticosa*, "Widdy," which, on damp barrens of Newfoundland, forms knee-high to waist-high dense thickets, abundant and coarse enough to be used as emergency fire-wood,[1] wanders out to dry barrens and becomes almost unrecognizable (PLATE 240, FIG. 1). *Potentilla nivea*, on damp or turfy slopes of Newfoundland or Gaspé often forming loose mats, with leaflets 2.5–3 cm. long, is forced to struggle on the dry gravels, making wonderful little columns (PLATE 240, FIG. 2) dating back a full half-century (as shown by the marcescent bases of old rosettes) and with tap-roots de-

[1] When I asked a native of Bonavista Bay how they prepare "Widdy" for fire-wood, he replied: "We rips up de whole tree, roots and all."

scending straight down for 3 or 4 dm. So with *Lesquerella* (PLATE 240, FIG. 3), the plants reduced to ancient obconic crowns. The succulent (and edible) Roseroot, *Sedum roseum*, on damp rocks growing strong, with many stems 2–3 dm. high and leaves 2–3 cm. long, can stand hard conditions; but the most arid barrens reduce it to a stature often of only 3 cm. *Draba incana* L., given a good opportunity, grows 3 dm. high, with large scattered leaves; but, like the *Sedum*, it can maintain itself on the driest of Newfoundland barrens by condensation to a height of 2 cm. (PLATE 239, FIG. 5). Seaside Plantain, *Plantago juncoides* Lam. (*decipiens* Barneoud), which in favorable conditions may have leaves 2 dm. long and 1 cm. or more broad, with scapes 2 dm. high and spikes 1 dm. long, is almost too minute (PLATE 240, FIG. 4) to be seen in the dry gravel. *Poa alpina* has the leaves distichous, at least theoretically; but the character is often not easily seen in the lush plants of mountain meadows and wet rocks, plants up to 6.5 dm. high, with broad leaves half as long and pyramidal panicles often 1 dm. in diameter. When, however, *P. alpina* gets into the driest of barrens it cuts out all overgrowth and the strongly marked distichous character of the foliage becomes emphasized (PLATE 240, FIG. 5). *Euphrasia*, too, although annual, responds quickly to the arid habitat. On shores with plenty of moisture *E. purpurea* var. *Farlowii* may be loosely branched and 1 dm. high, with internodes 1 cm. long. On the dry barrens, however, it is content with a full height of 1 or 2 cm.

Already nearly half the known species of the Arctic American Archipelago are known from sea-level in western Newfoundland. In view of the fact that in many cases these species are known only as the rarest of localized relics and in view, furthermore, of the vast extent of unexplored barrens on the West Coast, it should not surprise us if, eventually, practically the complete Arctic American flora is found to grow in this arid section of temperate North America.

Part III. Some Taxonomic Results of Recent Collections in Newfoundland.

In the following notes range-extensions chiefly of considerable magnitude are recorded; and, since it has been imperative to study anew many groups, the revisions of such as are largely represented in Newfoundland are included. Some groups, however, still under revision or awaiting fuller study, are necessarily omitted. Besides our own

collections a few others of special note should be mentioned. Mrs. Sinclair Kennedy (Rachel B. Kennedy) has already reported[1] on some of her discoveries in southwestern Newfoundland; Mrs. George W. Jeffers (Anne M. Jeffers) collected in 1929 about Raleigh, on Pistolet Bay, and added materially to our knowledge of that fascinating region; Mrs. Harold Ayre (Agnes M. Ayre) has been very active on the Avalon Peninsula, where she has added some very striking Atlantic European species to the known flora of Newfoundland; in 1930, Mr. K. P. Jansson spent considerable time in the region of Millertown, near where one of my parties had done extensive botanizing in 1911, and, afterward, in a brief trip to Bonne Bay, he added two species to the Newfoundland flora. Some of the more significant of these discoveries by others are added to our own.[2]

Woodsia alpina (Bolton) S. F. Gray. To the very few Newfoundland stations add the following. Bonne Bay: limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1115.

W. glabella R. Br. The following are new stations. Bonne Bay: crevices of limestone cliffs, very scarce, Tucker's Head, and crevice of limestone cliff opposite Lomond, *Fernald, Long & Fogg*, nos. 1117, 1118. Lower Humber Valley: very rare, crevices of dry limestone, Hannah's Head, no. 1116.

Thelypteris noveboracensis (L.) Nieuwl. The northern limit in Newfoundland seems to be at Bonne Bay: boggy spruce thickets near Winterhouse Brook, *Fernald, Long & Fogg*, no. 1125.

T. Robertiana (Hoffm.) Slosson. Apparently more frequent on limestones of the West Coast than previously supposed. The following are the new stations. St. John Bay: wooded talus of limestone cliff, Crow's Head, *Fernald, Long & Fogg*, no. 1129. Bonne Bay: talus of limestone cliffs near Stanleyville, no. 1130; bushy talus of limestone cliff, Lord-and-Lady Cove, no. 1131. Bay of Islands: turf over limestone talus, Druid's (or Raglan) Head, no. 1127; spruce thicket at base of limestone cliff west of Big Barachois, no. 1128. Lower Humber Valley: crevices of dry limestone, Hannah's Head, no. 1126. Plant gummy, aromatic; large plants more than 4 dm. high, with fronds 2 dm. broad.

T. cristata (L.) Nieuwl. A new northeastern limit is the following. St. John Bay: bushy swale back of Eddy's (or Old Man's) Cove, *Fernald, Long & Fogg*, no. 1135. Plants fruiting but very small, up to 2.2 dm. high.

*Athyrium Filix-femina (L.) Roth, var. sitchense Rupr. See Butters, Rhodora, xix. 204 (1917). Collections of 1923, misidentified

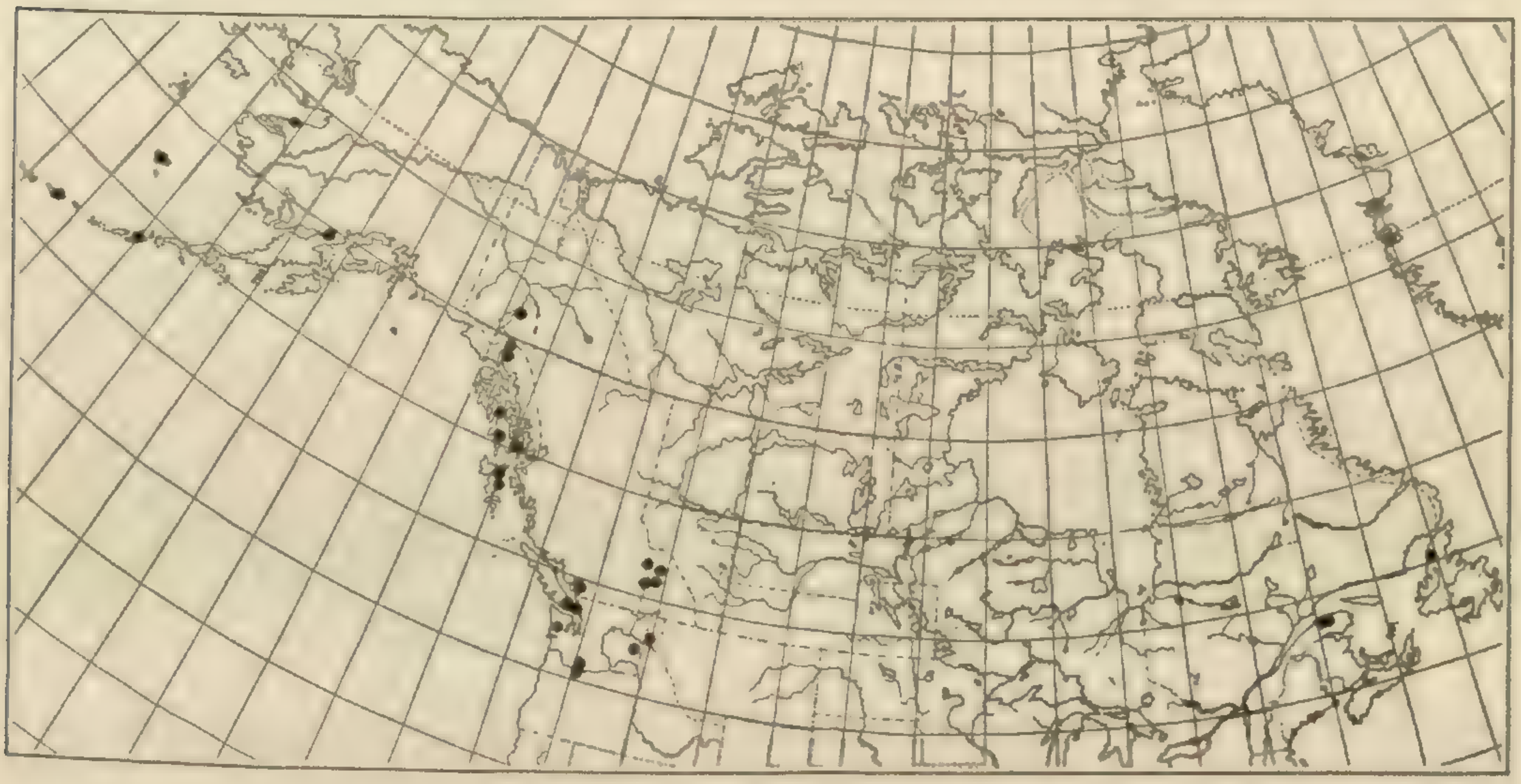
[1] *Some Additions to the Newfoundland Flora*, Rhodora, xxxii. 3–4 (1930); *Further Notes from Southwestern Newfoundland*, Rhodora, xxxiii, 207–209, tt. 216, 217 (1931).

[2] In the following notes species not previously recorded from Newfoundland are indicated by an asterisk.

and distributed as *A. angustum*, var. *rubellum*, prove to be this characteristic plant of northwestern America. The Newfoundland stations follow. HIGHLANDS OF ST. JOHN: thickets below limestone escarpment, western face of Bard Harbor Hill, *Fernald & Long*, no. 27,240; steep springy quartzite banks of brook, Southwest Gulch, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,241.

The only other stations known in eastern North America are on the Shickshock Mts. of Gaspé and Matane Cos., Quebec. MAP 13.

A. ALPESTRE (Hoppe) Rylands. The plant of Bard Harbor Hill reported in RHODORA, xxviii. 148 (1926) as var. *americanum* seems to be nearer the typical European *A. alpestre* (See Fernald, RHODORA, xxx. 47, 48, tt. 165, 166 (1928)). The following is an addition to the



Map 13. Range of ATHYRIUM FILIX-FEMINA, var. SITCHENSE.

Newfoundland collections there cited. HIGHLANDS OF ST. JOHN: wet quartzite rocks along Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 1153.

ADIANTUM PEDATUM L., var. ALEUTICUM Rupr. Typical, especially of magnesian rock, near the West Coast. The following are recent new stations. BONNE BAY: wet rocks by waterfall, Shoal Brook, *Fernald, Long & Fogg*, no. 1163; talus of limestone cliff opposite Lomond, no. 1164. BAY OF ISLANDS: wet depressions and borders of rills, serpentine ridge, North Arm, and dry serpentine ridge, North Arm, *Long & Fogg*, nos. 6 and 8; by rill, serpentine ledges, Red Rocks, Lark Mountain, *Fernald*, no. 7.

Typical *Adiantum pedatum* is unknown in Newfoundland, although, through confusion of the French *Capillaire* (*Adiantum Capillus-Veneris*) with the Newfoundland CAPILLAIRE or MAIDENHAIR BERRY,

Chiogenes hispidula of the *Ericaceae*, it has been reported. Thus, Sir Richard Bonnycastle, writing of Newfoundland plants with assurance but with "first-hand unfamiliarity" with them, naïvely stated: "The maiden hair (adiantum pedatum) is a little trailing plant, seeking sheltered places, and is one of the most beautiful of the family of filices, or ferns. It bears a little fruit, white, and like an ant's egg, which contains so much saccharine matter as to be lusciously sweet when made into a jam or preserve. It is occasionally brought to families here by the girls who follow the berry-picking trade; but it is preserved and not used for capillaire, as in Canada [referring to medicinal use of *Adiantum*]."

Botrychium simplex E. Hitchc. Apparently rare in Newfoundland, but more probably overlooked. The following are recent collections. Bay of Islands: dry gravelly slope, Lark Harbor, *Fernald, Long & Fogg*, no. 18; turfy pasture-slope, Curling, *Fernald, Long & Fogg*, no. 1171; sterile turfy slope, Petrie's, *Fernald & Long*, no. 1172.

*B. angustisegmentum (Pease & Moore) Fernald, Rhodora, xvii. 87 (1915). Bay of Islands: very scarce, on sterile turfy slope, Petrie's, *Fernald & Long*, no. 1174, growing with *B. simplex* and *B. matricariaefolium* A. Br.; the station, indicated to us by Mr. Frank Morris, the first east of central New Brunswick. See p. 95.

Equisetum pratense Ehrh. Reported for the first time in Newfoundland in Rhodora, xxviii. 149 (1926), from St. John Bay. Extending south at least to Bay of Islands: thicket near Morley's Pond, *Fernald, Long & Fogg*, no. 1182.

Lycopodium clavatum L. The northern known limit on the West Coast is on St. John Bay: spruce thicket on dry heath-barren southwest of Port au Choix, *Fernald, Long & Fogg*, no. 1191.

L. obscurum L. The northern known limit on the West Coast is on Bonne Bay: dry spruce woods, Island Cove, Main (or East) Arm, *Fernald, Long & Fogg*, no. 1193.

L. sabinaefolium Willd., var. sitchense (Rupr.) Fern. Rhodora, xxv. 166 (1923). The northernmost station known on the West Coast is on Bonne Bay: peaty and turfy upper quartzite slope (alt. 600–650 m., Killdevil, *Fernald, Long & Fogg*, no. 1195.

*L. complanatum L., var. canadense Victorin, Contrib. Lab. Bot. Univ. Montréal, no. iii. 70 (1925). Bay of Islands: peaty and gravelly thicket, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 34.

L. tristachyum Pursh. The northern known limit on the West Coast is in the Lower Humber Valley: dry limestone gravel, Hannah's Head, *Fernald & Long*, no. 1196.

Pinus Strobus L. The northern limit on the West Coast seems to be at Bonne Bay, where, we are told, it has been common on sheltered areas. The extraordinary *f. prostrata (Mast.) Fern. & Weath.,

NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, POTENTILLA FRUTICOSA; FIG. 2, P. NIVEA; FIG. 3, LESQUERELLA ARCTICA, var. PURSHII; FIG. 4, PLANTAGO JUNCOIDES, var. GLAUCA; FIG. 5, POA ALPINA.

Rhodora, xxxiv. 168 (1932), occurs on the bleak serpentine mountains of Bay of Islands: Blomidon, *Mackenzie & Griscom*, no. 10,032; North Arm, *Long & Fogg*, no. 37. See p. 11.

Typha latifolia L. Bonne Bay: bushy margin of open savannah near mouth of Main River, plants all sterile, *Fernald & Long*, no. 1202.

Said by Mr. W. A. Preble to be abundant, and regularly harvested for "flags" in barrel-making, at Baker Brook, 12 miles north of Bonne Bay. See p. 90.

Sparganium multipedunculatum (Morong) Rydb. See Fernald, Rhodora, xxvii. 190 (1925). To the two recorded stations in Newfoundland add the following. Avalon Peninsula: 20-Mile Pond (Windsor Lake), *A. M. Ayre*. Bay of Islands: marshy border of pond at foot of serpentine ridge, North Arm, *Long & Fogg*, no. 42.

Potamogeton confervoides Reichenb. The northernmost known stations are at Bonne Bay: shallow pools in bog-barrens at 400–550 m. alt., tableland of Lookout Mountain, *Fernald, Long & Fogg*, no. 1206; alpine ponds, July 28, 1930, *K. P. Jansson*. See p. 85.

P. gramineus L., var. spathulaeformis Robbins. To the very few Newfoundland stations add St. John Bay: shallow marl-pond in limestone barren, Eastern Point, *Fernald, Long & Fogg*, no. 1209.

P. praelongus Wulfen. To the small number of Newfoundland stations add Bay of Islands: Morley's Pond, *Fernald, Long & Fogg*, no. 1211. See p. 14.

P. bupleuroides Fern. The northernmost known station is at the head of Bonne Bay: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1212.

*Ruppia maritima L., var. obliqua (Schur) Aschers. & Graebn. See Fernald & Wiegand, Rhodora, xvi. 123 (1914). Bonne Bay: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1214. See p. 91.

*R. maritima, var. intermedia (Thedenius) Aschers. & Graebn. See Fernald & Wiegand, l. c. 124 (1914). Bonne Bay: with the latter in brackish tidal mud at mouth of Main River, *Fernald, Long & Fogg*, no. 1215.

Heretofore known in eastern North America only from Rimouski Co., Quebec (Trois Pistoles, *Fernald & Pease*, no. 24,826). See p. 91.

*R. maritima, var. brevirostris Agardh. See Fernald & Wiegand, l. c. Bonne Bay: with the two preceding, brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1216.

Heretofore known in America only from pools on the Côte Nord, the Mingan Islands and the Magdalen Islands. See p. 91.

*R. maritima, var. rostrata Agardh. See Fernald & Wiegand, l. c. 125. District of Burgeo and La Poile: pool in brackish sand back of Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 47. Bay of Islands: brook in salt marsh, Lark Harbor, no. 46.

Scheuchzeria palustris L., var. americana Fernald, Rhodora, xxv. 178 (1923). The northernmost known station in Newfoundland is on Bonne Bay: open savannah near mouth of Main River, *Fernald & Long*, no. 1221.

Festuca capillata Lam. As already noted, *F. capillata* is a part of the indigenous flora of southern Newfoundland, already recorded from southeastern and southwestern districts. An intermediate station is in Burgeo and La Poile: dry peaty crests of gneiss hills near Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 57.

Festuca rubra L. This complex species (often treated as several species) is highly developed in Newfoundland. As an aid to identification of these diverse plants the following key to those occurring in eastern America is proposed.:

a. Foliage comparatively soft, not strongly whitened (except in f. *glaucescens*) . . . . *b.*
  b. Lemmas glabrous, scabrous or merely strigose-hirsute: panicles up to 2.3 dm. long, often with elongate branches . . . . *c.*
    c. Basal leaves setaceous or linear-involute, 0.5–1 mm. in diameter . . . . *d.*
      d. Basal offshoots all or in great part divergent or decumbent, forming loose mats . . . . *e.*
        e. Lemmas distinctly awned . . . . *f.*
          f. Lemmas glabrous . . . . *g.*
            g. Spikelets 7–10 mm. long, with 3–7 florets: 2d glume 3–4.5 mm. long: body of 1st lemma 4–6 mm. long.
              Foliage green . . . . . *F. rubra* (typical).
              Foliage whitish . . . . . Forma *glaucescens.*
            g. Spikelets 1–1.7 cm. long, with 6–10 florets: 2d glume 4–6 mm. long: body of 1st lemma 6–8 mm. long . . . . . Forma *megastachys.*
          f. Lemmas puberulent or strigose-hirsute . . . . . Forma *squarrosa.*
        e. Lemmas awnless or merely mucronate . . . . . Var. *mutica.*
      d. Basal offshoots all erect, intravaginal, with leaves mostly elongate (1.5–6 dm.) and erect: culms tall (2.5–9 dm.) Var. *commutata.*
    c. Basal and cauline leaves all flat, 1.5–3 mm. broad: spikelets 1–1.7 cm. long, 6–10-flowered: body of 1st lemma 5.5–7 mm. long . . . . . Var. *multiflora.*
  b. Lemmas densely villous to lanate: panicle narrow and spiciform or with short branches, 0.5–1.5 dm. long: spikelets 1–1.5 cm. long . . . . . Var. *arenaria.*
a. Foliage stiff, somewhat wiry, strongly whitened: spikelets 0.9–2 cm. long, 6–10 flowered: body of 1st lemma 5–7.5 mm. long, glabrous . . . . . Var. *juncea.*

F. rubra (typical). Turfy, gravelly or rocky slopes and shores, or in mossy bogs and thickets, common (except on the highest summits) throughout Newfoundland. Forma glaucescens (Hartm.) Holmb., not yet noted. Forma squarrosa (Fries) Holmb. (Var. *subvillosa* Mert. & Koch). Bay of Islands: Wild Cove, *Waghorne*, no. 39; cliffs near Frenchman's Cove, *Mackenzie & Griscom*, no. 10,096.

Forma MEGASTACHYS (Gaud.) Holmb. NOTRE DAME BAY: Baccalieu Island, July, 1902, *Sornborger;* shores of Pike's Arm, *Fernald, Wiegand & Bartram*, no. 4662.

*F. RUBRA, var. MUTICA Hartm. Extending from Greenland south to Newfoundland, Anticosti and the Gaspé Peninsula. EXPLOITS VALLEY: railroad gravel, Millertown Junction, *Fernald, Wiegand & Darlington*, no. 4658. HIGHLANDS OF ST. JOHN: springy cliffs and talus above Overfall of Deer Pond Brook, *Wiegand, Gilbert and Hotchkiss*, no. 27,376.

*F. RUBRA, var. COMMUTATA Gaud. (Var. *fallax* (Thuill.) Hackel). EXPLOITS VALLEY: portage route from Depot Camp on Mary Ann Lake to Junction Brook, *Fernald, Wiegand & Bartram*, no. 4661; gravelly bank near Rushy Pond, *Fernald, Wiegand, Bartram & Darlington*, no. 4667. BAY OF ISLANDS: boggy meadows and wet grassy slopes, Birchy Cove (Curling), *Fernald, Wiegand & Kittredge*, no. 2672.

*F. RUBRA, var. MULTIFLORA (Hoffm.) Aschers. & Graebn. AVALON PENINSULA: gravelly railroad bank between Waterford Bridge and St. John's, *Fernald & Wiegand*, no. 4666. HA-HA BAY: strand south of Raleigh, *Wiegand, Gilbert & Hotchkiss*, no. 27,375. BAY OF ISLANDS: woods and thickets on slaty brookside, Curling, *Fernald, Long & Fogg*, no. 1230.

*F. RUBRA, var. ARENARIA (Osbeck) Fries. AVALON PENINSULA: damp mossy or turfy hollows on hill south of St. John's, *Fernald & Wiegand*, no 4664. VALLEY OF GANDER RIVER: dry gravelly bank, Glenwood, *Fernald, Wiegand & Darlington*, no. 4667. BONNE BAY: limestone ledges and talus, Shag Cliff, *Fernald, Long & Fogg*, no. 1233. BAY OF ISLANDS: turfy spots on slaty calcareous talus, Cutwater Head, *Fernald, Long & Fogg*, no. 1231; meadow on Governor Island, *Eames & Godfrey*, no. 5872.

*F. RUBRA, var. JUNCEA (Hackel) Richter. AVALON PENINSULA: rocky soil, base of cliff, Bell Island, Conception Bay, *Howe & Lang*, no. 1283. BONNE BAY: serpentine tableland, Bonne Bay, *Fernald, Wiegand & Kittredge*, no. 2669. BAY OF ISLANDS: gravelly shore, Blomidon Brook, *Mackenzie & Griscom*, no. 10,095. BAY ST. GEORGE: Barachois Brook, *R. B. Kennedy*, no. 37.

FESTUCA **prolifera** (Piper), comb, nov. *F. rubra prolifera* Piper, Contrib. U. S. Nat. Herb. x. 21 (1906). MAP 14.

The alpine plant of the highest mountains of New Hampshire, Maine, Quebec and Newfoundland (as well as lower stations on the limestones of Gaspé, Anticosti and Newfoundland) has never seemed to me like a mere viviparous state of the lowland *Festuca rubra* L., a species which abounds at sea-level and primarily on silicious soils throughout the coastal area from Labrador to New Jersey and even to the Carolinas. Yet, when he published it as a subspecies Piper hesitated to accord it rank higher than a "state" of *F. rubra*.

> The plant of the White Mountains which has been referred to *F. ovina vivipara* L. is in reality a viviparous form or state of *F. rubra*, differing only in its viviparous spikelets. It is said to be the only form of the plant in the White Mountains, and while properly a state rather than a subspecies, may be named as above. It seems surprising that no similar form occurs in Europe.

Since Piper wrote the above paragraph I have had much experience with the alpine plant. In its reddish and membranaceous basal sheaths coarsely ribbed and quickly disintegrating into loose fibers and its usually loose habit of growth, it is certainly nearer to the complex *Festuca rubra* L. than to *F. ovina* L. and the other eastern North American relatives of *F. ovina*, *F. brachyphylla* Schultes, *F. vivipara* (L.) Sm.[1] and *F. capillata* Lam., in all of which the basal sheaths are whitish and coriaceous, scarcely costate and not readily disintegrating. In the latter group of species (Sect. *Ovinae*, subsect. *Intravaginales* Hackel) the anthers are only one-third to one-half as long as the palea; in *F. ovina* 2.5–3 mm. long, in *F. brachyphylla* 0.5–1 mm., in *F. vivipara* unknown, in *F. capillata* 1.5–2 mm. *F. rubra*, however, in its multiform variations has the anthers longer, one-half to three-fourths the length of the palea, in our eastern American varieties 2.5–4.5 mm. long.

Map 14. Range of Festuca prolifera.

Ordinarily the alpine *Festuca prolifera* of calcareous to circumneutral areas does not bear fertile spikelets, but in 1929, on the limestone cliffs about Bonne Bay in Newfoundland, Messrs. Long, Fogg and I were fortunate enough to secure it with the normal simple racemes of viviparous spikelets mixed on some individuals with non-viviparous spikelets bearing anthers. The well developed anthers are only 1.5–2 mm. long; and the well developed lemmas are awnless, either quite muticous or merely attenuate to pointed, but not with awned tips. Similar lemmas are found on all specimens in which they have not

[1] For note on the specific distinctions of *F. vivipara* see Fernald, Rhodora, xxviii. 151 (1926).

MUHLENBERGIA UNIFLORA, var. TERRAE-NOVAE: FIG. 1, habit, × 1; FIG. 2, spikelet, × 10.

FESTUCA PROLIFERA, var. LASIOLEPIS, TYPE collection: FIG. 3, habit, × 1; FIG. 4, spikelet, × 4.

changed to leafy tufts and in texture they are decidedly more membranaceous than in *F. rubra*. The latter species, except in rare cases (in which, however, the large anthers are regularly developed) has distinctly awned lemmas. In *F. rubra*, likewise, the inflorescence in all well developed plants is clearly a panicle, with at least the lower branches forking, bearing 9–70 firm spikelets, or in some of the arctic forms with the spikelets closely crowded. In *F. prolifera*, on the other hand, the inflorescence is a simple flexuous raceme of 3 to 8 spikelets, the lowest branch rarely bearing a second sessile spikelet.

With many morphological characters and great constancy and with a very definite restriction to cold or alpine habitats in calcareous or other basic or neutral soils, *Festuca prolifera* seems to be a clear-cut endemic species of eastern North America. In its basal sheaths and loosely cespitose to subrepent habit it is related to *F. rubra*. In its awnless and membranous lemmas and in its almost uniformly proliferous habit it is close to *F. vivipara*, which reaches its southern limit at the northern limit of *F. prolifera* (the Shichshock Mts. and western Newfoundland). In its membranous and awnless lemmas it is similar, also, to *F. brachyphylla*, which extends south to western Newfoundland, the Shickshock Mts. and northern Vermont, but which has the basal sheaths of *F. ovina* and the anthers only 0.5–1 mm. long. In size of anther *F. prolifera* matches *F. capillata* but there the resemblance ceases, *F. capillata* with the sheaths of *F. ovina*, densely cespitose habit, and short coriaceous or chartaceous tightly inrolled lemmas.

Festuca prolifera occurs in two extremes: the typical plant of the White Mountains and the Gaspé Peninsula, as well as southwestern Newfoundland, with glabrous spikelets; and the more northern plant (of midwestern Newfoundland and Anticosti), with lemmas pilose. The two extremes are represented by the following collections.

F. PROLIFERA (typical). Spikelets glabrous.—NEWFOUNDLAND: shelves of limestone cliff, Druid's (or Raglan) Head, Bay of Islands, *Fernald, Long & Fogg*, no. 1235; talus slope of the marble region between Mt. Musgrave and Humbermouth, *Fernald, Wiegand & Kittredge*, no. 2670, in part (mixed with *F. brachyphylla*); dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port au Port Bay, *Fernald, Wiegand & Kittredge*, no. 2668 (transition to var. *lasiolepis*), *Fernald & St. John*, no. 10,788. QUEBEC: abrupt western calcareous slopes, alt. 1000–1100 m., Tabletop Mts., *Fernald & Collins*, no. 364; wet rocks and chimneys, alt. 825–1125 m., Northeast Branch of R. Ste. Anne des Monts, Tabletop Mts.,

Fernald, Dodge & Smith, no. 25,433; gravelly and sandy beaches and bars, R. Ste. Anne des Monts, *Fernald & Collins*, no. 415; damp rocks, waterfall of Ouillet Brook, Mt. Fortin, *Fernald & Pease*, no. 24,904; wet calcareous cliffs and ledges, northern base of Mt. Collins, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,431; dry talus and ledges of green schists, alt. 900–1125 m., Hanging Valley, Mt. Pembroke, *Griscom & Pease*, no. 25,432; cold chimneys in the schists at about 900–1000 m. alt., Fernald Pass, Mt. Mattaouisse, *Fernald & Smith*, no. 25,434. Maine: slide, West Wall of North Basin, Mt. Katahdin, July 13, 1900, *Fernald*. New Hampshire: in alpinis Montium Alborum, *Wm. Oakes;* White Mountains, in alpibus cum *Oxyria, Tuckerman;* alpine brooks, Mt. Washington, September 2, 1877, *Pringle* (type-collection); Gulf of Mexico, Mt. Washington, August 5, 1855, *Wm. Boott;* Great Gulf, Mt. Washington, July 29, 1887, *Faxon*, July 7, 1895, *Kennedy, Churchill*, August 10, 1896, *Faxon;* head of Great Gulf, alt. 5500 ft., *Pease*, no. 12,878; Alpine Garden above Raymond's Cascade, Mt. Washington, August 5, 1897, *E. F. Williams*.

*Var. **lasiolepis**, var. nov. (tab. 241, figs. 3 and 4), lemmatibus pilosis.—Calcareous region of western Newfoundland and Anticosti Island. Newfoundland: limestone cliffs near Stanleyville, Bonne Bay, August 9, 1929, *Fernald, Long & Fogg*, no. 1236 (type in Gray Herb., some spikelets fertile); talus of limestone cliff opposite Lomond, Bonne Bay, August 19, 1929, *Fernald, Long & Fogg*, no. 1237; turfy slopes below limestone crests (alt. 650 m.), Killdevil, no. 1238; dry humus over limestone ledges and shingle, Hannah's Head, lower Humber valley, July 12, 1929, *Fernald, Long & Fogg*, no. 1242. Quebec: Rivière Vaureal, Anticosti, 28 juillet 1925, *Victorin, Rolland-Germain & Louis-Marie*, no. 20,578; humus humide sur le calcaire, R. au Fusil, Anticosti, 19 août 1926, *Victorin & Rolland*, no. 24,775; dans l'humus humide calcaire, R. Jupiter, Anticosti, 12 août 1926, *Victorin & Rolland*, no. 24,776 (passing to typical *F. prolifera*); cailloutis calcaires, R. Galiote, Anticosti, 14 août 1926, *Victorin & Rolland*, no. 24,782; sur les platières récentes, avec *Braya humilis*, etc., R. Chicotte, Anticosti, *Victorin & Rolland*, no. 27,872; le long des rivages calcaires, R. de la Chute, Anticosti, 21 juillet 1927, *Victorin & Rolland*, no. 27,884; sur les platières en haut des gorges, R. au Fusil, Anticosti, 20 juillet 1927, *Victorin & Rolland*, no. 27,885.

Poa laxa Haenke. An additional station on the Highlands of St. John: quartzite cliffs and ledges of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1252, 1253. See p. 58.

P. trivialis L. As stated on p. 83, *Poa trivialis* has every appearance of being indigenous (though sometimes also introduced) in Newfoundland. Near the West Coast it is typical of peaty openings, glades or shores as well as on cliffs and talus or around springy spots.

P. saltuensis Fern. & Wieg., var. microlepis Fern. & Wieg. Rhodora, xx. 124 (1918). The northern limit seems to be on Bonne Bay: woods and thickets near mouth of Middle Brook, *Fernald, Long & Fogg*, no. 1275.

DACTYLIS GLOMERATA L. In eastern North America the Eurasian Orchard Grass is thoroughly naturalized. Three of the varieties occur with us (two of them in Newfoundland, the third likely to be found there). Typical D. GLOMERATA, common near settlements as far north as Bonne Bay, has the glumes and lemmas with long-ciliate keels but glabrous backs. Var. *ciliata* Peterm. (not yet known in Newfoundland) is similar, but with glumes and lemmas pubescent on the back.

*D. GLOMERATA, VAR. DETONSA Fries. Keels merely scabrous or short-hispid, not long-ciliate. BONNE BAY: swale at old camp-site, mouth of Main River, *Fernald, Long & Fogg*, no. 1276. Probably introduced in hay or straw, and presumably more generally naturalized.

CYNOSURUS CRISTATUS L.

In his unpublished manuscript, *Essai sur la Flore de Terre-Neuve et des Iles St. Pierre et Miclon*, based on his collections made from 1816–1820, and preserved in the general library of the Muséum d'Histoire Naturelle at Paris, where I had the privilege of consulting it in September, 1930, through the great kindness of the Chief Librarian, Dr. Léon Bultingaire, and his very helpful assistant, Mme. de Mouricaud, Bachelot de la Pylaie seemed to regard *Cynosurus* as indigenous in Newfoundland and the French Islands: "Cette espèce croît à l'ile St. Pierre dans les terrains inférieurs, parmi les autre graminées qui forment des espèces du prairieux naturelles: elle se trouve aussi à Terre-neuve dans semblables localités, le long des ruisseaux et des rivières, au bord des bois." The numerous collections from about the Bay of Islands and from the Avalon Peninsula (*Mrs. Ayre*) seem to be introductions; and Brother Arsène considered it (RHODORA, xxix. 207) an introduction on St. Pierre et Miquelon.

In the same manuscript La Pylaie recorded *MOLINIA CAERULEA (L.) Moench as a native of boggy barrens near the West Coast, saying (under *Melica caerulea* L.): "Cette plante croît dans les landes dures et marécagueses qui se trouvent sur la côte occidentale de Terre-neuve, à une certain distance du rivage: elle est rare. . . La plante ne diffère pas de celle qui croît en Europe." As yet this rare species has not been rediscovered in western Newfoundland but the habitat is right for *Molinia*, which should confidently be sought.

CATABROSA AQUATICA (L.) Beauv., VAR. **laurentiana**, VAR. NOV. (TAB. 242, FIGS. 3 and 4), foliis caulinis subacutis vel obtusis nec apice rotundatis; culmo valde grosseque sulcato; paniculis contractis lanceolatis vel anguste ovoideis 2–16 cm. longis 1–8 cm. diametro, internodiis imis 0.7–3 cm. longis, ramis horizontaliter patentibus ad

basin versus floriferis; spiculis ochroleucis vel purpurascentibus 1–2-floris; lemmatibus 2–3 mm. longis.—Springs, rills, pools and fresh to brackish marshes, near the coast, southeastern Labrador, Newfoundland, southeastern Quebec, Magdalen Islands, Prince Edward Island and northeastern New Brunswick. Labrador: Seal Islands, 1900, *E. B. Delabarre.* Newfoundland: swaley margin of pool in limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,286; turfy and gravelly beaten paths (stunted individuals), Flower Cove, *Fernald & Long*, no. 27,434; borders of springs at foot of limestone sea-cliffs, base of Pointe Riche, *Fernald, Long & Fogg*, no. 1277; wet runs and boggy spots in limestone barrens, near sea-level, Ingornachoix Bay, *Fernald, Wiegand & Kittredge*, no. 2601; boggy brooklet, Channel, *Howe & Lang*, no. 811; cold spring-ditch, Port aux Basques, *Fernald, Long & Dunbar*, no. 26,285. Quebec: wet places, Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2600; springy marsh near the shore, Harrington, *St. John*, no. 90,142; sur les rivages calcaires, Pointe-aux-Ammonites, *Victorin & Rolland*, no. 18,225; rivages du lac Salé, Ile à la Chasse, Archipel de Mingan, *Victorin & Rolland*, no. 25,881; le long de la petite rivière, Pointe de l'Est, Anticosti, *Victorin & Rolland*, no. 27,800; cold brook at edge of salt marsh, Ste. Anne des Monts, *Collins & Fernald*, no. 28; border of salt marsh, Capucins, July 28, 1922, *Fernald & Pease*, no. 24,867 (type in Gray Herb.); abundant in a cold brook, mouth of Bonaventure River, July 31, 1902, *Williams & Fernald;* August 2, 3 & 4, 1904, *Collins, Fernald & Pease;* springy holes at edge of salt marsh, Bic, *Fernald & Collins*, no. 872; brackish shore, Cacouna, *Victorin*, no. 595; shore of St. Lawrence, Temiscouata, August 7, 1879, *Pringle;* vicinity of Cap à l'Aigle, *J. Macoun*, no. 68,967. Magdalen Islands: brook in springy marsh and wet sand, Grindstone Island, *Fernald, Bartram, Long & St. John*, nos. 6882, 6883; sur les dunes humides, Ile du Hâvre-au-Ber, *Victorin & Rolland*, no. 9040. Prince Edward Island: cold springy shore, Southport, *Fernald & St. John*, no. 6881; spring-fed marsh, Southport, *Fernald & St. John*, in Pl. Exsicc. Gray. no. 121. New Brunswick: fresh to brackish marshy ground, Dalhousie, *Fernald & Pease*, no. 24,868.

I am unable to place the plant of cold springs, rills and pools in eastern Canada, Newfoundland and Labrador with any of the described variations of *Catabrosa aquatica.* The aggregate species has a wide range across Eurasia, north to subarctic regions; in western North America, from Alaska to the Saskatchewan, south, chiefly in the mountains, to Arizona, Colorado and Nebraska; and borders of the Gulf of St. Lawrence and the Straits of Belle Isle. In the latter area, where the plant abounds in cold waters near the fisheries, it might easily be taken to be a recent introduction from Europe, especially as it is as greedily eaten by the cattle as the European plant

and, apparently, spread by them to wet cowtrails and roads some distance from the pools in which it truly luxuriates. So generally have we come to associate the grass with the cattle-infested areas, where it is difficult to secure good specimens, that frivolous and classical members of my parties have nicknamed it "Cattlebrows'er,"[1] the name *Catabrosa* itself referring to the erose or *nibbled* margins of the glumes and lemmas.

Var. *laurentiana* is nearer to *Catabrosa aquatica*, var. *uniflora* S. F. Gray, than to other varieties of the species. Typical *C. aquatica* is apparently the large European plant with the cauline leaves rounded at tip; the panicles very long (mostly 1–2.5 dm. long), with delicate capillary whorled branches up to 1 dm. in length, whence one of the English names, WATER HAIR-GRASS. In the well developed panicles (1.5–2.5 dm. long), shown in FIG. 1, the lowest whorls are 3–6 cm. apart, the longer branches (4–10 cm. long) are spikelet-bearing chiefly above the middle and until very mature are slightly ascending. The spikelets are 2 (sometimes 3 or 4)-flowered. The culms (just above the

[1] I realize that, in putting on record such pleasantries, which often relieve the monotony of "changing driers" and of "salivating" specimens, there is danger of being wholly misunderstood by those who lack the "Yankee sense of humor." At least, when I recorded one of our bits of botanical humor in 1926 the effort fell flat. Writing of *Carex microglochin*, "one of the rarest and taxonomically most interesting of species, having the primitive rachilla, which is obsolete in most modern *Carices*, projecting from the tip of the perigynium," so that it is "about as well placed in the Antarctic genus *Uncinia* as in the great genus *Carex*," I wrote, in would-be humorous vein: "Consequently, when we first came upon this unpretentious but truly aristocratic plant, scattered and rare as we felt it ought to be, we carefully dug the individuals and gently tucked their bristly tops into paper bags that we might lose none of the precious fruits; at that stage we spoke of it by its full name, *Carex microglochin*, and had a feeling that we ought to give it some title. A little later, finding it more common than the few straws in herbaria could possibly suggest, we began to feel familiar and called it 'Mike'; then, as the weeks wore on and we saw it in every low place in the lime-barrens, we referred to it as 'Mike O'Glochlin;' and before we had left the Straits Coast, noticing that it followed many paths where its prickly little fruits had obviously been spread by pedestrians with their high skin-boots, our attitude had completely changed and we spoke of it as 'Mike O'Glochlin, the Bootlegger'."—Fernald, RHODORA, XXVIII. 61 (1926).

This was intended as an obvious joke; but the greatest humor in the series was reached only when the matter was re-served by the most prominent of British local botanists, my friend, the late Dr. Druce of Oxford, whose remarkable array of degrees and honors (M.A., D.Sc., LL.D., F.R.S., F.L.S.) bespoke his botanical reputation: "At Capstan Point they found a wonderful Arctic flora which included the 'excessively local relic-species' having the primitive rachilla, which is almost obsolete in modern sedges, projecting from the top of the perigynium. They familiarly called it 'Mitre Oglochin,' noticing that it had been spread along many paths by the high skin boots of pedestrians to which the prickly little fruits had become attached."—Druce, Bot. Soc. Exch. Cl. Brit. Isl. Rept. viii. 339, 340 (1928). The fishermen of the Straits of Belle Isle are not bishops, although my characterization of *Carex microglochin* as "truly aristocratic" may have created the impression that it frequently associates with "mytrede bisshopes."

upper leaf) are closely and shallowly furrowed (FIG. 2). Var. *uniflora* (var. *subtilis* Hook.), as shown by Lange, Fl. Dan. xvii. fasc. li. 3, t. mmmii. fig. 2 (1883), and by many European specimens (see FIGS. 5 and 6), is very similar to the newly proposed var. *laurentiana* in having the cauline leaves narrowed to tip, the culms coarsely furrowed, the panicle comparatively small and the spikelets mostly 1-flowered; but the panicle is lax and open as in typical European *C. aquatica*, with the branches subascending until mature. The Rocky Mountain representative of the species (FIGS. 7 and 8) seems to be var. *uniflora*.

(*To be continued*)

CATABROSA AQUATICA: FIG. 1, panicle, × 1; FIG. 2, summit of culm, × 6.

C. AQUATICA, var. LAURENTIANA: FIG. 3, panicle, × 1; FIG. 4, summit of culm, × 6.

C. AQUATICA, var. UNIFLORA: FIGS. 5 (European) and 7 (American), panicles, × 1; FIGS. 6 (European) and 8 (American), summits of culms, × 6.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 140*)

Agropyron § Goularda in Eastern North America.—With four recent monographic studies of North American *Agropyron* one would suppose it possible to place our few plants of this group with relative satisfaction. In 1897 there appeared Scribner & Smith's extensive *Native and Introduced Species of the Genera Hordeum and Agropyron;*[1] in 1905 Piper's brief but critical *Agropyron tenerum and its Allies;*[2] in 1910 Pease & Moore's *Agropyron caninum and its North American Allies;*[3] and in 1932 Malte's *The so-called Agropyron Caninum* (*L.*) *Beauv. of North America.*[4] All four papers are the result of close study and careful consideration but if we accept the conclusions of one of the revisions we find ourselves at odds with the others. The genus is notoriously difficult and individual judgments as to specific and varietal lines are bound to differ; consequently, no one treatment can now be worked out which will be wholly satisfactory to all students. In the area best known to me, the region from southern Labrador and Newfoundland to New England and the Great Lakes, the genus has its great development in eastern North America; and assiduous collecting (nearly 300 numbers) of it and close study of its complexities, both in the field and in the herbarium, during a period of forty-five years have given me a bowing acquaintance with the group which makes it difficult to follow, without some divergence, any of the four revisions above noted.

The greatest discrepancies are found in the treatments of § *Goularda,* the nonstoloniferous group of which *Agropyron caninum* (L.) Beauv. is typical. As Malte clearly shows[5] (pp. 28–30), true *A. caninum* of Eurasia is quite a different species from the long-awned plant of North America which has erroneously passed for it. Abundant herbarium material supports this decision, so that the primary premises of Pease & Moore's revision, that our plant is *A. caninum* and that such very different plants as *A. latiglume* (Scribn. & Sm.)

[1] Scribner & Smith, U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 23–36 (1897).
[2] Piper, Bull. Torr. Bot. Cl. xxxii. 543–547 (1905).
[3] Pease & Moore, Rhodora, xii. 61–77 (1910).
[4] Malte, Nat. Mus. Can. Ann. Rep. for 1930, 27–48, plates 1–5 (1932).
[5] Earlier students, Beal and others, had doubted the occurrence of *A. caninum* in America; and in 1900 Scribner (in Brainerd, Jones & Eggleston, Fl. Vt. 9) implied that we do not have it.

Rydb. and *A. tenerum* Vasey are merely variations of it, lose much of their force. The North American counterpart of the Eurasian *A. caninum*, the plant (PLATE 244, FIGS. 1–4, and MAP 18) with long awns, occurring generally from Newfoundland and eastern Canada to New England and Pennsylvania, thence across the continent, is *Triticum subsecundum* Link (1833), the type of which is illustrated by Malte (his plate v), while its very large extreme (our PLATE 244, FIGS. 5–7 and MAP 19), with glumes, lemmas and often the awns longer, is *A. Richardsoni* Schrad. (1838) or *A. unilaterale* Cassidy (1890), not *A. unilaterale* Beauv. (1812). Scribner & Smith, Hitchcock (in Gray's Manual) and Rydberg all maintain the two latter (*A. "caninum"* and *A. Richardsoni*) as distinct species; Pease & Moore as different varieties; and Malte treats them as strictly identical!

Agropyron Richardsoni and the so-called *A. caninum* of North America sometimes overlap in their characters, but the former has a distinctive disruption of geographic range which suggests that it is not merely a selected series of overgrown individuals. Whereas *A. "caninum"* (MAP 18) is a common or frequent plant of either calcareous or non-calcareous ledgy and gravelly shores and dry woods and thickets from eastern Newfoundland to Pennsylvania, thence westward to the Pacific, the coarse *A. Richardsoni* (MAP 19) is decidedly localized east of the Great Lakes: confined to the St. Lawrence system eastward to Gaspé and Anticosti, chiefly in calcareous soils. Therefore, *A. Richardsoni*, with a distinctive geographic range and in its typical development with clearly recognizable morphological characters, is, it seems to me, at least a good geographic variety.

Malte, agreeing in principle with Pease & Moore, treats *Agropyron tenerum* Vasey (PLATE 243, FIGS. 1–3), including both *A. pseudorepens* Scribn. & Sm. (PLATE 243, FIGS. 4–6) and *A. novae-angliae* Scribn. (PLATE 243, FIGS. 7–9), and North American *A. "caninum"* (PLATE 244, FIGS. 1–4) including *A. Richardsoni* (PLATE 244, FIGS. 5–7) as one polymorphic species; but, having demonstrated that the North American plant is not the Eurasian *A. caninum*, he correctly takes up for the aggregate-species of North America the next available name, *A. trachycaulum* (Link) Malte (1932), based on *Triticum trachycaulum* Link, apparently overlooking the fact, however, that the same combination under *Agropyron* was made by Steudel in 1854 and was repeated by Candargy in 1901.

The type of *Agropyron trachycaulum*, illustrated by Malte, is exactly *A. tenerum* Vasey (1885), but, again agreeing with Pease & Moore,

Malte merges with it two plants, *A. pseudorepens* Scribn. & Sm. and *A. novae-angliae* Scribn., which in eastern America are much more widely dispersed than typical *A. trachycaulum*. True *A. trachycaulum* or *A. tenerum* (PLATE 243, FIGS. 1–3 and MAP 15) (also *Triticum pauciflorum* Schwein. (1824)) has very slender and elongate spikes, with the tightly appressed spikelets scarcely imbricated, the tips of most of them failing to reach the spikelet next above (on the same side); many of the internodes of the rachis strongly quadrate, with all four sides deeply concaved, the middle internodes mostly 0.8–2 cm. long; glumes coriaceous or subcoriaceous, with hyaline border 0.4–0.6 mm. broad and the closely embraced rachillas (PLATE 243, FIG. 3) usually only scabrous or appressed-pubescent. This plant, true *A. trachycaulum* or *A. tenerum*, is widely dispersed in western North America, from southern Alaska to California, thence eastward to the more western of the Great Lakes; east of Minnesota and adjacent Ontario and Wisconsin it is represented in the extensive eastern collections in the Gray Herbarium only from limestone cliffs, slopes and gravels near the Gulf of St. Lawrence in eastern Quebec: Anticosti and the Mingan Islands, the Gaspé Peninsula and Bic.

The other plants merged, without any indication of doubt by Pease & Moore (except that they separated the shorter-spiked specimens of *A. pseudorepens* as *A. caninum*, var. *Hornemanni*) and, again, by Malte, with true *A. trachycaulum* (*A. tenerum*) usually have dense spikes of well-imbricated and less closely appressed spikelets; the internodes of the rachis usually not strongly quadrate but with convex or corrugated backs and commonly 2 (instead of 4) ciliate edges; the middle internodes short; the glumes inclined to be more herbaceous and narrowly margined (hyaline margins only 0.1–0.4 mm. broad); the free rachillas commonly villous (with loosely spreading pubescence). These plants with denser spikes appear in two well marked geographic trends. The first of these (PLATE 243, FIGS. 4–6 and MAP 16) is prevailingly calcicolous, occurring very generally from southern Labrador and the lower St. Lawrence to southern Maine on limy soils or on the margins of the sea or in brackish or saline marshes. Inland it is more inclined to take to the upland, occurring (as *A. caninum*, var. *Hornemanni* Pease & Moore) in the subalpine and alpine (not always calcareous) regions of Maine and New Hampshire. It next appears on the north shore of Lake Superior and extends thence across the calcareous plains westward, where it is known as

A. pseudorepens. This plant has comparatively dense spikes, in maturity (in fruit) averaging 7 mm. in diameter, in anthesis much thicker, and with glumes averaging 12.5 mm. long. As stated, the shorter-spiked members of this series were called by Pease & Moore *A. caninum*, var. *Hornemanni* and many botanists have identified them with *A. violaceum* (Hornem.) Lange, based upon *Triticum violaceum* Hornem. Malte clearly shows, however, that the name *Triticum violaceum* was a *nomen confusum* which should be rejected, while *T. biflorum*, β. *Hornemanni* Koch, involved in the typification of *A. caninum*, var. *Hornemanni*, was, by description, *A. latiglume* (Scribn. & Sm.) Rydb., an arctic species with unkeeled and broad-margined broadly oblong to narrowly obovate glumes and pubescent lemmas, which is unknown in eastern North America south of northern Labrador.

The other dense-spiked plant with villous rachillas, merged by Pease & Moore and now by Malte with typical *Agropyron trachycaulum* (*A. tenerum*), is *A. novae-angliae* (PLATE 243, FIGS. 7–9 and MAP 17), characterized by its slender spike (in maturity averaging only 5 (3–6) mm. in diameter), with the glumes averaging 8 (5–10) mm. long and the lemmas proportionally small. *A. novae-angliae* passes into *A. pseudorepens*, which in turn merges into *A. trachycaulum*, but in its typical form *A. novae-angliae* in the East is a plant of low altitudes and usually on neutral to acid soils (either rock, gravel or wet peat) from northern Labrador to the granitic hills of southern New England, thence westward. In general, then, while typical *A. trachycaulum* in eastern America is confined to the limestones bordering the Gulf of St. Lawrence in Quebec, *A. pseudorepens*, also chiefly calcicolous, has a wider eastern range, from southern Labrador to southern Maine and northern New Hampshire; and *A. novae-angliae*, chiefly of neutral or acid soils, extends into the cooler parts of southern New England.

Although very different in their extremes, all these plants seem to pass, as Pease & Moore and, later, Malte have independently maintained, into one another.[1] In their best developments, however, they all have rather distinct geographic ranges, at least in eastern America; and I find myself looking upon them as reasonably defined geographic

[1] The late Charles Walter Swan, an unassuming but wonderfully close student of New England grasses, left many suggestive notes on specimens he studied. On one of *A. trachycaulum*, var. *glaucum* ("*A. caninum*"), collected at Willoughby in 1898, he wrote: "Cut off the awns and compare. Why, 'violaceum' [*i. e. novae-angliae*]."

AGROPYRON TRACHYCAULUM: FIG. 1, inflorescence, × 1, from TYPE collection of *A. tenerum*; FIG. 2, inflorescence, × 1, from Quebec: FIG. 3. internode of rachilla, closely embraced by lemma, × 10.

Var. MAJUS: FIG. 4, mature (closed) inflorescence, × 1, from TOPOTYPE of *A. pseudorepens*; FIG. 5, young inflorescence, × 1, from Newfoundland; FIG. 6, internodes of rachilla, × 10.

Var. NOVAE-ANGLIAE: FIG. 7, young inflorescence, × 1, from type-region, Willoughby, Vermont; FIG. 8, ripe inflorescence, × 1, from Massachusetts; FIG. 9, internodes of rachilla, × 10.

varieties. It does not seem satisfactory to submerge as identical with *A. trachycaulum* (*A. tenerum*) such pronounced variations as *A. pseudorepens* and *A. novae-angliae;* nor does it seem any more satisfactory to treat as strictly identical *A. Richardsoni* (*A. unilaterale*) and the smaller "*A. caninum.*"

All or nearly all of our varieties of *Agropyron trachycaulum* may have green or more or less glaucous or glabrous or more or less pubescent phases. These usually occur without appreciable geographic segregation (often in closely adjacent colonies), and long experience in the field has abundantly demonstrated that such variations may be expected throughout the ranges of any of the major or primary varieties. Pease & Moore, following what seems the more logical method in such cases, treated them as *formae*, this being the procedure which for several years the more progressive systematists have been adopting. Thus, the late Otto Holmberg, whose regrettable death has left unfinished the most scholarly of Scandinavian floras, treated such minor tendencies as forms, reserving the varietal category for stronger variations, with notable differences in size of parts or with morphological differences and somewhat definite ranges: *Festuca ovina,* f. *hispidula* and f. *laeviflora,* but var. *vivipara* and var. *duriuscula; F. rubra,* f. *glaucescens* and f. *planifolia,* but var. *commutata* and var. *oelandica; Agropyron repens,* f. *pubescens,* but var. *maritimum;* etc. In general, I have for some years been trying to follow this procedure and so have Blake, Eames, Weatherby and others in America. Malte, discussing such variations, concludes that "all variations of the same nature ought to be considered as equals, i. e. ought to be conceded equal taxonomic rank and value." As pure logic, wholly dissociated from the actual vagaries of Nature, this may be conceded; but, surely, when applied in classification, the logic often fails; characters which in one group are of great taxonomic importance in another may prove wholly unimportant and to be a series of nonconcomitant and unresolvable variables.

In the present case I find myself unable to follow my friend, Malte, in treating selected plants with "at least" a trace of pubescence on the old shrivelled basal sheaths, persisting from last year's new vegetative shoot, as true varieties on a par with variations so strong that they are often considered good species: such phases of the long-awned plants as his *Agropyron trachycaulum,* vars. *ciliatum* and *glaucum* or of the awnless plants as his vars. *trichocoleum* and *Fernaldii.* Nor can I

treat as coordinate with the true geographic varieties (which Scribner & Smith, Piper, Hitchcock and Rydberg have treated as full species) the more or less glaucous individuals (Malte's *A. trachycaulum,* vars. *glaucescens, Fernaldii, caerulescens* and *glaucum*), minor tendencies which differ from the green individuals only in having more wax on the surface. By drying these over heat or by immersing them in hot water *A. trachycaulum,* var. *glaucescens* becomes the green plant (*A. violaceum,* var. *majus* Vasey); var. *Fernaldii* becomes the green var. *trichocoleum* and vars. *caerulescens* and *glaucum* promptly become their greener counterparts.

As a matter of fact, furthermore, authentic specimens of two of these so-called "varieties" from the same locality are so nearly indistinguishable that only by the closest examination can one detect that they may possibly have been collected from different clumps. *Agropyron trachycaulum,* var. *Fernaldii* (Pease & Moore) Malte, based on *A. caninum,* var. *tenerum,* f. *Fernaldii* Pease & Moore, is a slightly glaucous phase with "At least the lowest sheaths pubescent." Its designated type was collected by *John Macoun,* no. 68,978, at Cap à l'Aigle on "August 8," 1905 (in Gray Herb.) and as identical with it Pease & Moore cited another collection in the Gray Herbarium from Cap à l'Aigle, "*J. Macoun* . . . no. 68979," with the date (on the label) also "Aug. 8th, 1905." Unfortunately, Pease & Moore made a slight but confusing error, for Macoun's no. 68,978 (their type) has the date on the label (in Macoun's hand) "Aug. 24th," instead of "August 8," as cited by them. The two sheets look like young material (no. 68,979, labelled "Aug. 8th") and over-ripe material from the same colony (no. 68,978, labelled "Aug. 24th") and the transposition of the date would be of little consequence had not Malte included no. 68,979 as one of the three known collections of his new *A. trachycaulum,* var. *glaucescens* which is distinguished from his var. *Fernaldii* only by having "Sheaths glabrous." The type of var. *Fernaldii* (no. 68,978) has all the cauline leaves and sheaths quite glabrous but, when diligently searched for, two or three of the marcescent old sheaths at the base of the plant, but by no means all, show some pilosity. The younger material (no. 68,979) from the same locality, which Malte puts into a second of his varieties because it has "Sheaths glabrous," shows, likewise, in the material sent by Macoun to the Gray Herbarium, very definite pubescence upon some of the new basal offshoots. The treatment of such trivial individual divergencies (in these cases

with lack of apparent divergence) as true varieties does not seem wise, and their recognition as anything but visible but taxonomically unimportant departures from a theoretical type does not seem worth while. At any rate, such slight ecological or physiological responses are not comparable with the varieties which show strong departures in characters of the spikelets, in habitats and in ranges, departures so pronounced that several agrostologists have considered them true species.

In § *Holopyron*, represented in eastern America by species with elongate rootstocks, there is less difference of opinion. All recent authors are agreed as to the distinctness of *Agropyron dasystachyum* (Hook.) Vasey, *A. Smithii* Rydberg, *A. repens* (L.) Beauv. and the American representative of *A. pungens* (Pers.) R. & S (PLATE 245, FIG. 5). In recent years *A. pungens* has been called by some European botanists some kind of hybrid: by Ascherson & Graebner *Triticum junceum* × *repens;* by Rouy *A. junceum* × *littoreum;* by Holmberg *A. litorale* × *repens*. Now, a species (PLATE 245, FIG. 5), thoroughly consistent in all its characters and clearly matching European *A. pungens*, is indigenous at the sea-margin, on shingly beaches, sand dunes and borders of salt marshes, from Cape Breton to Cape Cod, the plant described from the Maine coast as *A. tetrastachys* Scribn. & Sm. It is a thoroughly typical element in the flora of this district, along with *Puccinellia maritima* (Huds.) Parl., *Festuca rubra*, var. *juncea* (Hackel) Richter, *Carex maritima* O. F. Mueller, *Polygonum Raii* Bab., *Suaeda maritima* (L.) Dumort., *Lathyrus japonicus* Willd., vars., and other maritime species which share the European and the American shores of the North Atlantic. Yet neither *Agropyron junceum*, *A. littoreum* nor *A. litorale* is known on the coast of northeastern America. Under the circumstances, with *A. pungens* a constant member of our maritime flora, it seems inevitable that it should be maintained as a true species.

Without overloading the present paper with needlessly detailed descriptions, the leading diagnostic characters of the eastern American species of *Agropyron* of both sections, as I now interpret them, may be briefly summarized in the synoptic key which follows. Since there has been much confusion in the group (especially in § *Goulardа*), sufficient specimens in that section (preferably of numbered exsiccatae which will be mostly represented in numerous herbaria) are cited to render my interpretation perhaps intelligible to others. The spikes of

characteristic specimens of the different species and varieties in § *Goulardda* are shown, life-size, in PLATES 243 and 244.

For the loan of several types of Vasey and of Scribner & Smith I am indebted to the great kindness of Professor A. S. Hitchcock; for the loan of the type of *Triticum pauciflorum* Schwein. to Dr. Francis W. Pennell; and for material possibly representative of Cassidy's views to Professor Ernest C. Smith.

KEY TO THE SPECIES OF AGROPYRON IN EASTERN NORTH AMERICA

a. Spikelets not strongly flattened, at maturity readily disintegrating, the individual florets promptly disarticulating, leaving the persistent glumes: inner face of fruit flattish or broadly concaved: culms solitary or loosely to densely cespitose, without elongate rootstocks. § GOULARDA (Husnot) Holmb. Skand. Fl. pt. 2: 269 (1926). . . . *b.*

b. Anthers 1–2.5 mm. long, at most ⅓ as long as the lemmas: lemmas awnless or with essentially straight and ascending awns. . . . *c.*

c. Glumes flat or slightly convex, scarcely keeled, herbaceous or submembranaceous, oblong to narrowly obovate, with hyaline margin 0.5–1 mm. broad: lemmas pubescent: spike 3–13 cm. long: plant arctic or subarctic with us . . . . . 1. *A. latiglume.*

c. Glumes keeled, subcoriaceous to herbaceous, linear-lanceolate to elliptic, with hyaline margin 0.1–0.6 mm. broad: lemmas glabrous (rarely scabrous): spikes 0.4–2.5 dm. long: plants of temperate regions. . . . . 2. *A. trachycaulum.*

b. Anthers 3 mm. long: lemmas with strongly arched-divergent long awns. . . . . 3. *A. spicatum.*

a. Spikelets strongly flattened or 4-sided, at maturity dropping intact from the rachis, the individual florets not readily detached: anthers at least ½ as long as the lemmas, 3–6 mm. long: inner face of fruit deeply channeled: culms solitary or tufted: rootstocks very elongate and extensively creeping. § HOLOPYRON Holmb. l. c. 273 (1926). . . . *d.*

d. Lemmas and rachillas densely villous to lanate. . 4. *A. dasystachyum.*

d. Lemmas and rachillas glabrous to scabrous. . . . *e.*

e. Glumes linear-attenuate, tapering with straight margins from below the middle: spikelets 7–13-flowered: cartilaginous band of upper nodes of culm shorter than thick. . . . . 5. *A. Smithii.*

e. Glumes lanceolate to oblong, gradually curving to tip from above the middle: spikelets 3–7 (in the maritime no. 6, –11)-flowered: cartilaginous band of upper nodes of culm as long as thick.

Spike nearly square in section: internodes of rachis thick, usually 4-angled: spikelets 7–11 (very rarely only 3–5)-flowered: glumes coriaceous, with broadly rounded keel and ribs: leaves hard, very glaucous, mostly involute, with remote coarse ribs: top of culm solid (closely filled with pith). . . . . 6. *A. pungens.*

Spike usually not conspicuously quadrate: internodes of rachis thin, rounded on the back, 2-edged: spikelets 2–7-flowered: glumes herbaceous, with slender keel and ribs: leaves soft, flat, with crowded fine nerves: top of culm hollow. . . . . 7. *A. repens.*

1. A. LATIGLUME (Scribn. & Sm.) Rydberg, Bull. Torr. Bot. Cl. xxxvi. 539 (1909). *A. violaceum latiglume* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 30 (1897). *A. biflorum latiglume* (Scribn. & Sm.) Piper, Bull. Torr. Bot. Cl. xxxii. 547 (1905). *A. caninum*, var. *latiglume* (Scribn. & Sm.) Pease & Moore, RHODORA, xii. 73 (1910).—An arctic species, extending south in eastern America only to LABRADOR: Rama, August 20–24, 1897, *Sornborger*, no. 263, as *A. violaceum*.

Agropyron latiglume belongs to an arctic and subarctic series, including the American *A. alaskanum* Scribn. & Merr. and *A. yukonis* Scribn. & Merr. and the Old World *A. mutabile* Drobov. The material from continental boreal America is as yet too scanty to make out the true status of all these reputed species.

2. A. TRACHYCAULUM (Link) Steud.—A highly variable North American species, represented in eastern America by the following five geographic varieties.

a. Awns wanting or very short, at most ½ as long as body of lemma....*b.*

b. Glumes coriaceous or subcoriaceous, with hyaline margins 0.4–0.6 mm. broad: spikelets in ours scarcely imbricated, the tips rarely reaching the bases of those above (on the same side): internodes of rachis often strongly quadrate, with all 4 sides concave and winged, mostly 0.8–2 cm. long; the 2nd internode 0.8–1.5 mm. broad, 0.5–1.3 mm. thick: rachilla usually scabrous or strigose, tightly embraced....Var. *typicum*.

b. Glumes herbaceous to subcoriaceous, the hyaline margin only 0.1–0.4 mm. broad: all or all but the lowest spikelets well imbricated: internodes of rachis shorter, mostly convex or merely corrugated on the back and with 2 narrow edges; the 2nd internode 0.3–0.8 mm. thick: rachilla usually villous, with spreading pubescence, free.

Glumes (excluding awns, when present) averaging 12.5 (10–16) mm. long: contracted fruiting spike averaging 7 (5–12) mm. thick.....Var. *majus*.

Glumes (excluding awns, when present) averaging 8 (7–10) mm. long: contracted fruiting spike averaging 5 (3–6) mm. thick.....Var. *novae-angliae*.

a. Awns nearly equaling to much longer than body of lemma.

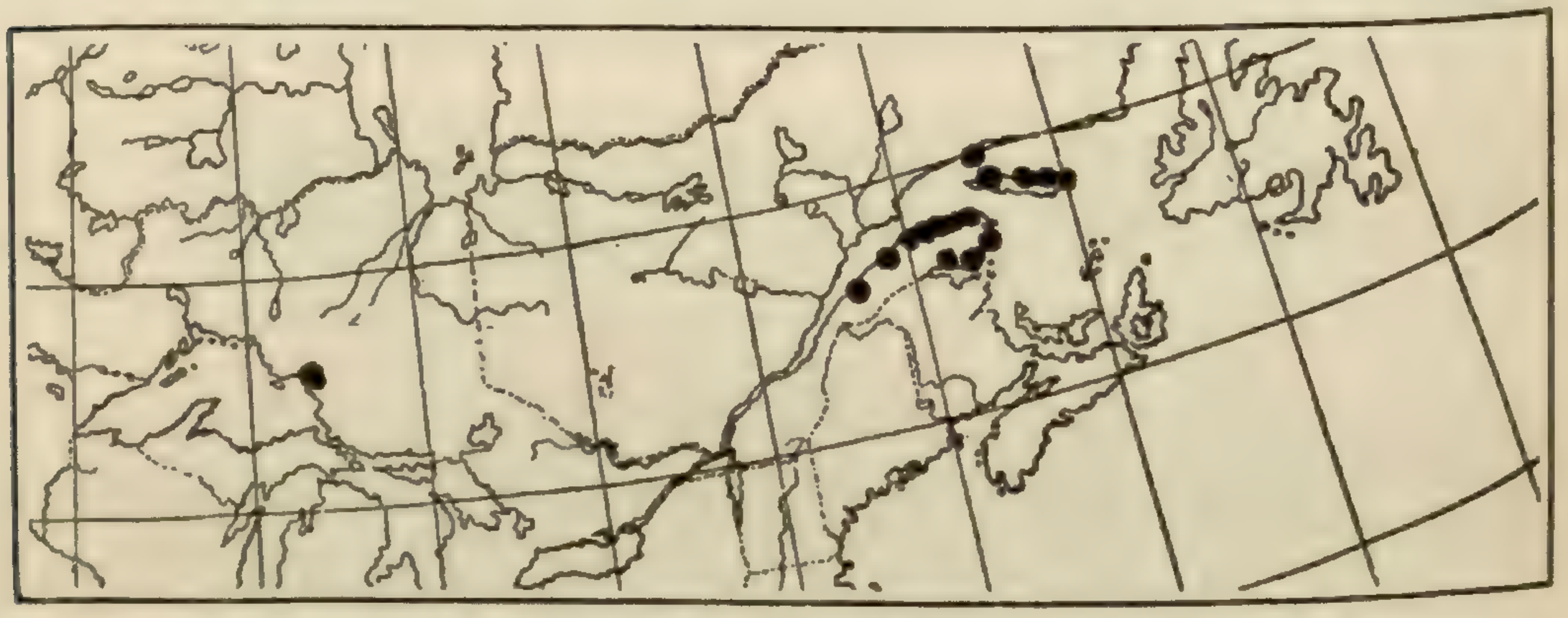
Glumes averaging 9 (6–12) mm. long: awns of lemmas 7–20 mm. long: contracted fruiting spike (excluding awns) averaging 5 (3–10) mm. thick.....Var. *glaucum*.

Glumes averaging 13.5 (12–18) mm. long: awns of lemmas 10–40 mm. long: contracted fruiting spike (excluding awns) averaging 9 (6–13) mm. thick.....Var. *unilaterale*.

Var. **typicum**. *Triticum trachycaulum* Link, Hort. Bot. Berol. ii. 189 (1833). *T. pauciflorum* Schwein. in Keating's Narr. Long's 2d Exped. ii. 383 (1824), not *A. pauciflorum* Schur (1859). *A. trachycaulum* (Link) Steud. Syn. Pl. Gram. i. 344 (1854);[1] Candargy, Étude Mon. Tribu Hord. 43 (1901), combination erroneously ascribed to

[1] For date of issue see Rendle, Journ. Bot. xxxvii. 33, 34 (1899).

"Host" (doubtless a misprint for "Hort"); Malte, Ann. Rep. 1930, Nat. Mus. Can. 42 (1932). *Crithopyrum trachycaulum* (Link) Steud. l. c. (1854). *A. tenerum* Vasey, Bot. Gaz. x. 258 (1885). *A. repens*, var. *tenerum* (Vasey) Beal, Grasses N. Am. ii. 637 (1896). *A. tenerum longifolium* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 30 (1897). *A. pseudorepens magnum* Scribn. & Sm. l. c. 34 (1897), extremely large spikelets. *A. tenerum magnum* (Scribn. & Sm.) Piper, Bull. Torr. Bot. Cl. xxxii. 546 (1905). *A. caninum*, var. *tenerum* (Vasey) Pease & Moore, Rhodora, xii. 71 (1910). *Zeia tenera* (Vasey) Lunell, Am. Midl. Nat. iv. 227 (1915). *A. trachycaulum*, var. *tenerum* (Vasey) Malte, l. c. 44 (1932). Plate 243, figs. 1–3, and map 15.—Western North America, from southern Alaska to California, eastward to western Ontario, Wisconsin (perhaps introduced), Iowa and Missouri (introduced); limestone soils about the Gulf of St. Lawrence, Quebec. The following selected specimens



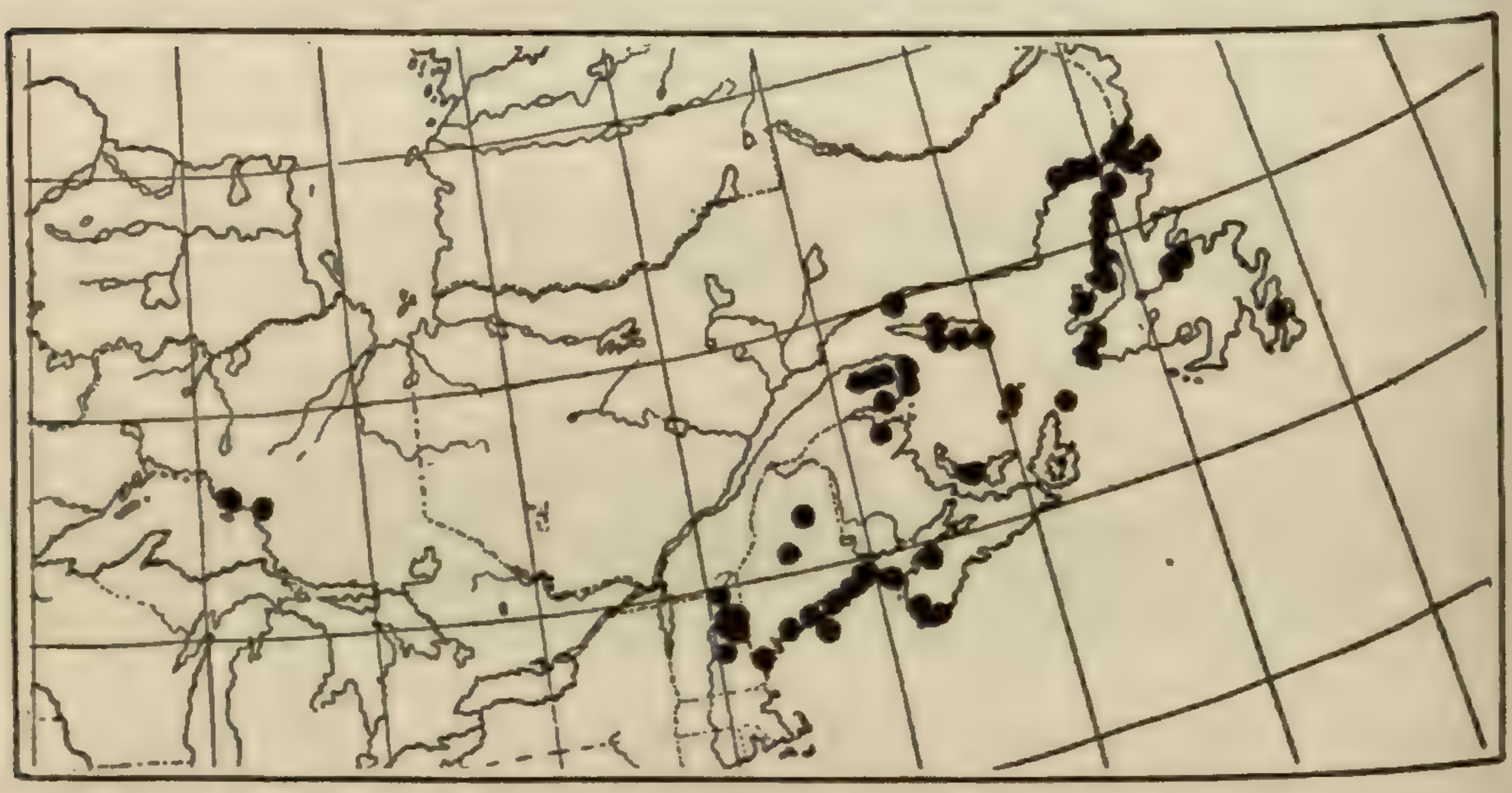
Map 15. Eastern Range of Agropyron trachycaulum, var. typicum.

(chiefly eastern) are typical. Quebec: sur les rivages calcaires, Grande Ile, Archipel de Mingan, *Victorin & Rolland*, no. 20,555; sur les platières calcaires, Riv. au Saumon, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 20,556; sur les alluvions près de l'embouchure de la rivière, Baie du Nord, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 20,588; sur les éboulis dans les gorges, R. Vaureal, Anticosti, *Victorin & Rolland*, no. 27,889; sur les bords de la petite rivière, Pointe de l'Est, Anticosti, *Victorin & Rolland*, no. 27,893; rivages calcaires, R. du Renard, Anticosti, *Victorin & Rolland*, no. 27,894; limestone-conglomerate talus, Mt. Ste. Anne, Percé, *Collins & Fernald*, no. 36; calcareous sea-cliffs between Mont Louis and R. à Pierre, *Fernald & Smith*, no. 25,465; Mt. St. Pierre, *Victorin, Rolland & Jacques*, no. 33,199; dry calcareous slaty talus of Mt. St. Pierre, *Fernald, Weatherby & Stebbins*, no. 2423; cobbly beach of Gulf of St. Lawrence, Cap au Renard, *Fernald & Pease*, no. 24,909; shore of St. Lawrence, Matane, August 3, 1909, *F. F. Forbes;* gravelly beach at Paspébiac Lighthouse, July 26, 1902, *Williams & Fernald;* gravelly beach, Tracadigash Point, Carleton, July 22, 1904, *Collins & Fernald;*

limestone-conglomerate cliffs and ledges, Cap au Massacre, Bic, July 16, 1904, *Collins & Fernald.* ONTARIO: sands at Pic R., July 30, 1869, *J. Macoun*, no. 175. WISCONSIN: Murphy's Railroad track, Green Bay, July 15, 1897, *Schuette.* MANITOBA: Emerson, July 17, 1887, *J. Fowler.* MINNESOTA: Garden Island, Lake of the Woods, *MacMillan & Sheldon*, no. 1353; Fort Snelling, *Mearns*, no. 780; Bridgeman, July, 1892, *Sheldon;* prairies, common, Montevideo, June 19, 1896, *Moyer;* Elmore, *Pammel*, no. 895; "Prairies of the St. Peter" [Minnesota R.], *Say*, 1823 (type of *Triticum pauciflorum* Schwein., in herb. Phil. Acad.). IOWA: Wheatland, *Ball*, no. 271; Ames, June 27, 1893, *F. C. Stewart;* Little Rock, *Ball*, no. 556. MISSOURI: rare, introduced along railroads, Sheffield, July 17, 1898, *Mackenzie*, no. 246, July 10, 1899, *Bush*, no. 142. COLORADO: Fort Garland, 1884, *Vasey* (type no. of *A. tenerum* Vasey, as designated by Piper, Bull. Torr. Bot. Cl. xxxii. 543 (1905))—form with very slender spike; near Empire, *Rydberg*, no. 2401 (type of *A. pseudorepens magnum* Scribn. & Sm., consequently of *A. tenerum magnum* (Scribn. & Sm.) Piper; in U. S. Nat. Herb.)—form with unusually stout spike. OREGON: along spring-runs in open places, near Grant's Pass, *Howell*, no. 256 (type of *A. tenerum longifolium* Scribn. & Sm., in U. S. Nat. Herb.).

Var. **majus** (Vasey), comb. nov. ?*A. violaceum, β. virescens* Lange, Consp. Fl. Groenl. 155 (1880). *A. violaceum*, var. *majus* Vasey, Contr. U. S. Nat. Herb. i. 280 (1893). *A. pseudorepens* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 34 (1897). *A. tenerum majus* Vasey ex Piper, Bull. Torr. Bot. Cl. xxxii. 543 (1905). *A. caninum*, var. *Hornemanni* Pease & Moore, RHODORA, xii. 73 (1910) in large part, but not as to name-bringing synonym, *Triticum biflorum β. Hornemanni* Koch, acc. to Malte, l. c. 38 (1932). *A. tenerum*, var. *pseudorepens* (Scribn. & Sm.) M. E. Jones, Contr. West. Bot. xiv. 19 (1912). *Zeia pseudorepens* (Scribn. & Sm.) Lunell, Am. Midl. Nat. iv. 226 (1915). PLATE 243, FIGS. 4–6, and MAP 16.—Chiefly in calcareous or subalkaline soils, southern Labrador (and ?Greenland) to southern British Columbia, south to coast of Maine, northern New Hampshire, Lake Superior (Ontario) Nebraska, Colorado, Nevada and Oregon. The following, selected from a large representation, are typical. LABRADOR: rocks, Forteau, *Fernald & Wiegand*, no. 2690. NEWFOUNDLAND: edge of salt marsh, Killigrew's, *Fernald & Wiegand*, no. 4691; dry cliffs and talus, Tilt Cove, *Fernald & Wiegand*, no. 4690; ledges, talus and gravel by Exploits R., Bishop Falls, *Fernald & Wiegand*, no. 4687; ledges, etc., Exploits R., Grand Falls, *Fernald & Wiegand*, no. 4686; gravelly and turfy strand near Isthmus Cove, Pistolet Bay, *Wiegand, Gilbert & Hotchkiss*, no. 27,435; turfy limestone barrens, Cape Norman, *Wiegand & Long*, no. 27,438; wet spruce, thicket, Flower Cove, *Fernald, Long & Dunbar*, no. 26,323; limestone ledges and gravel, St. Barbe, *Fernald, Long & Dunbar*, no. 26,324; turfy limestone shore, Plum Point, Brig Bay, *Fernald, Long*

& Dunbar, no. 26,325 (approaching var. *unilaterale*); peaty limestone barrens, St. John Isl., *Fernald et al.*, no. 27,436; turfy and gravelly shore, Back (or Bustard) Cove, *Fernald, Long & Fogg*, no. 1282; turfy terraces and slopes, Pointe Riche, *Fernald, Long & Fogg*, no. 1281; wet runs and boggy spots, Ingornachoix Bay, *Fernald & Wiegand*, no. 2680; damp shores, Port Saunders, *Fernald & Wiegand*, no. 2687; serpentine tablelands, alt. 380 m., Bonne Bay, *Fernald & Wiegand*, no. 2684; inside the strand, Southeast Arm, Bonne Bay, *Fernald & Wiegand*, no. 2693; shelves and talus of diorite, Western Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1283; dry sandy soil near sea-level, Bay of Islands, *Eames & Godfrey*, no. 5878; sea beach, Little River, *Mackenzie & Griscom*, no. 11,178. QUEBEC: limestone terraces, Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2689; grassy hillside, R. à la Truite, Brest, *St. John*, no. 90,169; sandy isle



Map 16. Eastern Range of AGROPYRON TRACHYCAULUM, var. MAJUS.

in R. St. Augustin, *St. John*, no. 90,168; grassy shore, Pointe au Maurier, Charnay, *St. John*. no. 90,170; grève de cailloutis calcaire, Lac Salé, Anticosti, *Victorin & Rolland*, no. 24,772; cailloutis calcaire, R. la Loutre, Anticosti, *Victorin & Rolland*, no. 24,773 (transition to var. *unilaterale*); sur les platières, R. Chicotte, Anticosti, *Victorin & Rolland*, nos. 27,890, 27,892; platières calcaires, R. MacDonald, Anticosti, *Victorin, Rolland & Louis-Marie*, nos. 20,553, 20,557, 20,559; falaises de la Montagne Saint-Alban, Cap Rosier, *Victorin et al.*, no. 17,834; calcareous walls of Grande Coupe, Percé, *Fernald & Collins*, no. 917, *Victorin et al.*, no. 17,833; calcareous alpine meadow, alt. 1000–1125 m., Table-topped Mt., *Fernald & Collins*, nos. 368, 372; subalpine meadows (alt. 1200 m.), Mt. Au Clair, Tabletop Mts., *Fernald & Smith*, no. 25,467; boggy spots at 1000 m., tableland of Mt. Albert, *Fernald & Collins*, no. 35; crevices and talus of serpentine, Lac au Diable, Mt. Albert, *Fernald & Collins*, no. 411; dans le massif de

AGROPYRON TRACHYCAULUM, var. GLAUCUM: FIG. 1, inflorescence, × 1, from the TYPE; FIG. 2, inflorescence, × 1, from TYPE of var. *caerulescens;* FIG. 3, inflorescence, × 1, from TYPE of var. *pilosiglume;* FIG. 4, internode of rachilla and base of lemma, × 10.

Var. UNILATERALE: FIG. 5, inflorescence, × 1, from Anticosti; FIG. 6, inflorescence, × 1, from Montana; FIG. 7, internode of rachilla and base of lemma, × 10.

serpentine, Ruisseau des Neiges, *Victorin et al.*, no. 17,829; dry schistose crests and talus, alt. 850–1000 m., Mt. Logan, *Pease & Smith*, no. 25,466; alluvial islands at mouth of Bonaventure R., August 4, 1904, *Collins, Fernald & Pease;* gravelly shore of St. Lawrence, Cacouna, August 8, 1902, *Fernald;* vicinity of Cap à l'Aigle, *J. Macoun*, nos. 68,978 (type of *A. caninum*, var. *tenerum*, f. *Fernaldii* Pease & Moore; consequently, of *A. trachycaulum*, var. *Fernaldii* (Pease & Moore) Malte), 68,979 (cited by Malte as var. *glaucescens* Malte); 68,981 (green state). MAGDALEN ISLANDS: sandstone bluffs, Grosse Isle, *Fernald, Long & St. John*, nos. 6937 (glaucous), 6938 (green). PRINCE EDWARD ISLAND: dry clearing, Indian River, *Fernald, Long & St. John*, no. 6943. NOVA SCOTIA: barrens, St. Paul I., *Perry & Roscoe*, no. 77; thicket bordering salt marsh, Villagedale, *Fernald, Long & Linder*, no. 20,104; rocky and gravelly beach (brackish), Eel Lake, *Fernald, Bean & White*, no. 20,101; brackish marsh, Abram R., *Fernald, Bean & White*, no. 20,103; thin open humus (on basalt), North Mt., Belle Isle, *Fernald, Bartram, Long & Fassett*, no. 23,342. NEW BRUNSWICK: brackish marsh, Bathurst, *S. F. Blake*, no. 5459; shelves of sea-cliffs (basalt), north of Whale Cove, Grand Manan, *Weatherby & Weatherby*, no. 5490. MAINE: Mt. Katahdin, August, 1892, *F. P. Briggs;* slide, West Wall, North Basin, Katahdin, July 13, 1900, *Williams, Fernald;* North Wall, North Basin, Katahdin, *S. J. Ewer*, no. 147; opening by Chimney Pond, Katahdin, *Ewer*, no 241; Mt. Kineo, August 26, 1867, *C. E. Smith;* damp basaltic shingle, Lubec, *Fernald*, no. 1365; calcareous ledges, Kelly Point, Pembroke, *Fernald*, no. 1369; edge of salt marsh, Roque Bluffs, August 6, 1919, *Knowlton;* dry sandy shore, Machiasport, July 25, 1914, *Knowlton;* rocky shore, Matinicus, August 6, 1919, *C. A. E. Long;* rocks along shore, Ocean Point, Boothbay, *Fassett*, no. 234; salt marsh, Wells Beach, July 23, 1898, *Fernald.* NEW HAMPSHIRE: railroad track, Northumberland, *Fernald & Pease*, no. 16,715; "in alpinis Montium Alborum," *Tuckerman;* Oakes Gulf, Mt. Washington, *Faxon, Churchill, Kennedy et al.;* Alpine Garden, Mt. Washington, *Faxon, Pease*, no. 10,600; Fan of Huntington's Ravine, *Pease*, no. 13,898; outlet of Lake of the Clouds, Mt. Washington, *Robinson*, no. 979; Ethan's Pond, Mt. Willey, August, 1877, *Faxon;* summit of Mt. Willard, July 19, 1894, *Williams;* border of rich deciduous woods, North Woodstock, *Fernald*, no. 11,566. VERMONT: gravelly bank, Canaan, *Pease*, no. 10,088. ONTARIO: Pic R., Lake Superior, *Loring;* mouth of Dog R., Lake Superior, *J. Macoun*, no. 176. NORTH DAKOTA: Devil's Lake, July 16, 1902, *Lunell.* SOUTH DAKOTA: Brookings, June 29, 1897, *Thornber.* NEBRASKA: Kearney, June 20, 1895, *Rydberg*, no. 2018 (type of *A. pseudorepens* Scribn. & Sm.), *Shear*, no. 272 (topotype of *A. pseudorepens*); Merriman, July 11, 1899, *J. M. Bates;* Broken Bow, alt. 2478 ft., *Pammel*, no. 54; Ravenna, *Pammel*, no. 59; wet valley near Whitman, *Rydberg*, no. 1619. WYOMING: Wood's Landing, Albany Co., *Nelson*, no. 3965; Pelican

Creek, Yellowstone Park, *Tweedy*, no. 624. Colorado: Walsenburg, Huerfano Co., alt. 6000 ft., *Clements*, no. 81; South Park, *E. L. Hughes*, no. 11. Nevada: Lone Mt., alt. 8000 ft., Elko Co., *P. B. Kennedy*, no. 4357; Truckee meadows, near Sparks, *Kennedy*, no. 3059. Oregon: 1884, *Cusick*, no. 1134 (type of *A. violaceum*, var. *majus* Vasey; consequently of *A. tenerum majus* Vasey; rachilla as in typical *A. trachycaulum*, but plant otherwise like the common eastern form). Washington: Pullman, *Piper*, no. 1910, in part (mixed with var. *novae-angliae*). British Columbia: Cascade, *J. M. Macoun*, no. 63,388.

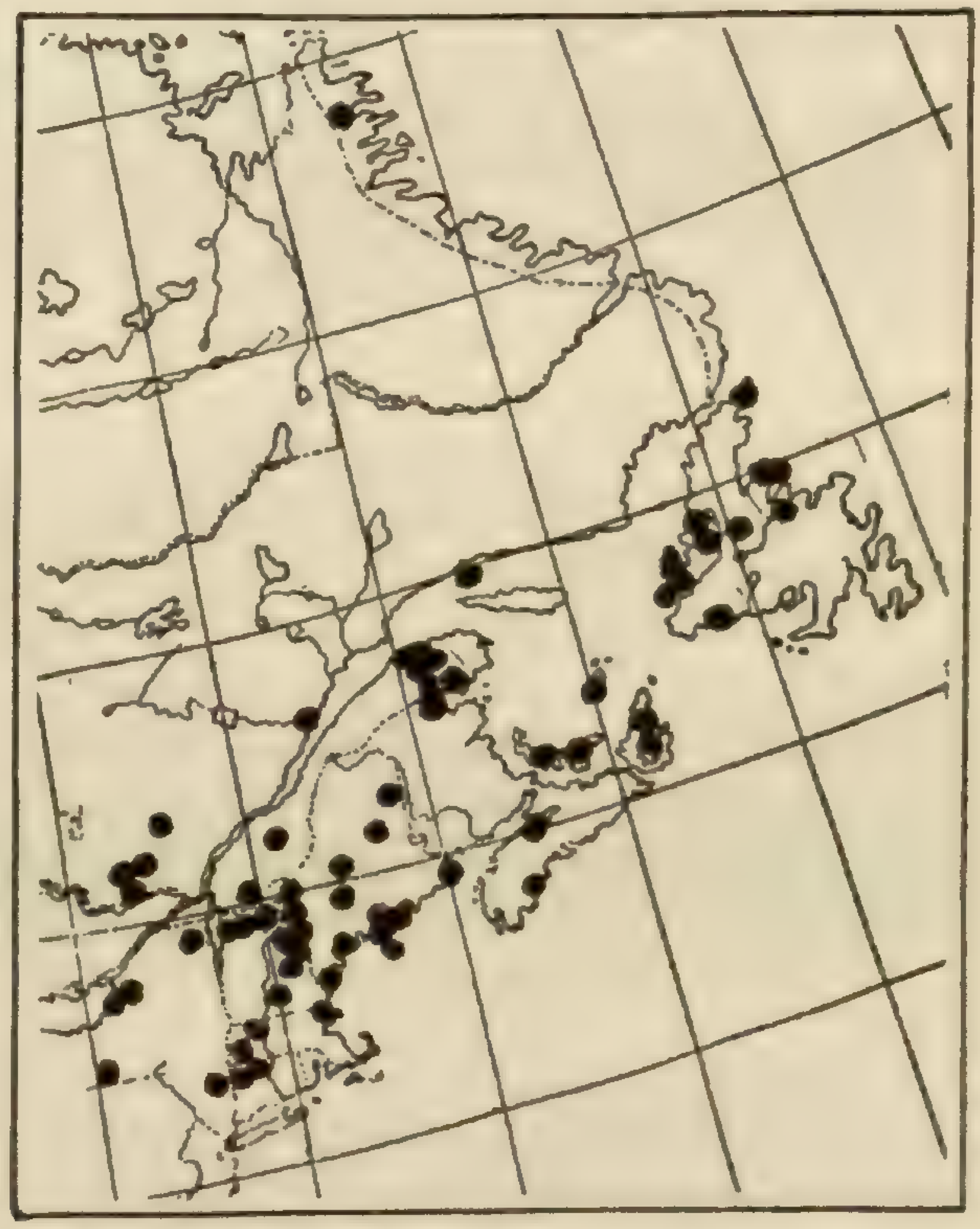
The sheaths, blades or spikes are more or less glaucous in the minor form or state:

A. caninum, var. *tenerum*, f. *Fernaldii* Pease & Moore, l. c., 73 (1910). *A. trachycaulum*, var. *glaucescens* Malte in H. F. Lewis, Can. Field-Nat. xlv. 201 (1931), name only, and Ann. Rep. 1930, Nat. Mus. Can. 45 (1932). *A. trachycaulum*, var. *Fernaldii* (Pease & Moore) Malte, l. c. 46 (1932).

The varietal name *Agropyron violaceum*, β. *virescens* Lange (1880) can hardly be taken up, although it is not impossible that Lange may have had our plant. Malte shows, however (pp. 38, 39), that there was great confusion as to its exact identity and that it is now "impossible to say what particular form it was." Although the type of *A. violaceum*, var. *majus*, for the loan of which I am indebted to Professor Hitchcock, has the rachillas scabrous rather than villous, it is otherwise quite like the common eastern plant and, in view of the inconstancy of this character in western material, it does not seem justifiable to reject this earliest available varietal name. The type of *A. pseudorepens* (*Rydberg*, no. 2018) is exactly the common plant of the shores of western Newfoundland and eastern Canada. The topotype (*Shear*, no. 272), collected on the same day, may well have come from the colony with the type. *A. caninum*, var. *Hornemanni* Pease & Moore was based on *Triticum biflorum*, β. *Hornemanni* Koch, which, according to Malte (p. 38), is *A. latiglume*. The plant of Pease & Moore is largely a short-spiked alpine extreme of *A. trachycaulum*, var. *majus*. As to the more or less glaucous phases of the variety which have been separated by Pease & Moore and by Malte, see the discussion on p. 166.

Var. **novae-angliae** (Scribn.), comb. nov. *A. novae-angliae* Scribn. in Brainerd, Jones & Eggleston, Fl. Vt. 9 (name), 103 (1900). *A. tenerum*, var. *novae-angliae* (Scribn.) Farwell, Rep. Mich. Acad. Sci. xxi. 355 (1920). *A. repens*, var. *novae-angliae* Scribn. & Sm. acc. to Farwell l. c. (1920) in synonymy. Plate 243, figs. 7–9, and map 17.

Acid to calcareous rock and gravel, bogs and open woods, northern Labrador to Alberta, south to Connecticut, southern New York, Michigan, Wisconsin, Nebraska, Colorado and Nevada. The following, selected from a large representation, are characteristic. LABRADOR: on granitic rock, river-delta at head of Nachvak Bay, *Woodworth*, no. 37. NEWFOUNDLAND: gravelly and rocky seashore, Snook's Arm, *Fernald & Wiegand*, no. 4689; bogs, Bishop Falls, *Fernald & Wiegand*, no. 4688; sandy beach, Sandy Lake, *Fernald & Wiegand*, no. 2685; partially shaded limestone escarpments, Burnt Cape, *Fernald & Long*, no. 27,437; gravelly strand, Southeast Arm, Bonne Bay, *Fernald & Wiegand*, no. 2692; serpentine gravel, The Tableland, Bonne Bay, *Fernald, Long & Fogg*, no. 1285; serpentine barrens, Blomidon, *Fernald & Wiegand*, nos. 2686, 2688; sandy flats, mouth of Blomidon Brook, Frenchman's Cove, *Mackenzie & Griscom*, no. 10,103; peaty and gravelly slopes, French (or Tweed) I., *Fernald, Long & Fogg*, no. 65; wet runs and boggy spots in limestone barrens, Table Mt., Port au Port Bay, *Fernald & Wiegand*, no. 2682; meadow in limestone barrens, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,011; cobbly barrier-beach, Great Barachois (or Barasway Bay), Burgeo and La Poile, *Fernald, Long & Fogg*, no. 66; turfy sand-plain, Sand Beach, west of Burgeo, *Fernald, Long & Fogg*, no. 64. QUEBEC: boggy thicket, Ile Ste Génèvième, Mingan Ids., *St. John*, no. 90, 171; rich wooded banks, R. Ste. Anne des Monts, *Fernald & Collins*, no. 171; on hornblende schist, Mt. Albert, *Fernald & Collins*, no. 405; crevices and talus of serpentine, Ruisseau à la Neige, Mt. Albert, *Fernald & Collins*, no. 416; Coulée d'Approche, Mt. Albert, *Victorin et al.*, no. 17,828; turfy and mossy slopes, Mt. Fortin, *Fernald & Pease*, no. 24,910; gravelly beaches and flats of Bonaventure R., August 5–8, 1904, *Collins, Fernald & Pease;* gravel beaches and bars, Little Cascapedia R., July 29 and 30, 1904, *Collins, Fernald & Pease;* platières, R. Petite Cascapedia, *Victorin, Rolland &*



Map 17. Eastern Range of AGROPYRON TRACHYCAULUM, var. NOVAE-ANGLIAE.

Jacques, no. 33,282; trap cliff, Tracadigash Mt., Carleton, July 24, 1904, *Collins, Fernald & Pease;* shore, Tadousac, August 6, 1892, *Kennedy;* Cache R., Lac Tremblant, August 2, 1922, *Churchill;* Perkins, Papineau Co., *Malte*, no. 119,241; Mt. King, près de Hull, *Victorin*, no. 15,261; Blue Sea Lake, Hull Co., *Malte*, no. 119,246; Wakefield, *Malte*, no. 119,239; dry serpentine ledges and gravel, Black Lake, *Fernald & Jackson*, no. 12,027; ledges, Mt. Elephantis, Brome, July 30, 1902, *Churchill, Pease*. Magdalen Islands: sandy sea-strand, Alright I., *Fernald, Long & St. John*, no. 6936. Prince Edward Island: moist rich woods and springy larch swamp, Bloomfield, *Fernald, Long & St. John*, nos. 6940, 6941; larch swamp, Dundee, *Fernald, Long & St. John*, no. 6942. Nova Scotia: rocky flood-plain of Barrasois R., *Nichols*, no. 339; crest of boulder and gravel barrier-beach, Great Bras d'Or, Grand Narrows, *Fernald & Long*, no. 20,106; talus of gypsum cliffs near Fivemile R., *Pease & Long*, no. 20,102; sea-shore thicket, Port Mouton, *Bissell & Graves*, no. 20,105. New Brunswick: Dalhousie, *Malte*, no. 119,247. Maine: cedar swamp, Blaine, September 7, 1896, *Fernald;* Caribou bog, Crystal, August 16, 1900, *Fernald;* rock-shelves, Mt. Kineo, *Cushman*, no. 1909; dry bank, Dead River, *Fernald*, no. 576 (type of *A. caninum*, var. *Hornemanni*, f. *pilosifolium* Pease & Moore); dry rocky woods, Lubec, *Fernald*, no. 1366; granite ledges, Jordan Bluffs, Mt. Desert I., *Stebbins*, no. 625; ledgy shore, Dark Harbor, Islesboro, *Woodward, Bissell & Fernald*, no. 8817; Elwell Point, South Thomaston, *Bissell, Fernald & Chamberlain*, no. 8818; beach, Monhegan Island, August 8, 1921, *Churchill;* rocky woods, York, *Fernald & Long*, no. 12,732. New Hampshire: dry open ledges, Diamond Peaks, Dartmouth College Grant, *Pease*, no. 10,501; dry shaded cliffs, Devil's Slide, Stark, *Pease*, no. 17,448; dry roadside, West Milan, *Pease*, no. 13,791; dry gravelly soil, Gorham, *Pease*, no. 12,208; copse, Randolph, *Pease*, no. 1730; roadside, Whitefield, *Pease*, no. 14,426; talus, Mt. Webster, *Pease*, no. 11,722; roadside, Carroll, *Pease*, no. 16,590; among rocks, Jackson, July 10, 1880, *J. A. Allen;* dry woods, Three Mile I., Meredith, *Pease*, no. 2515; in sphagnum, Alstead, *Fernald*, no. 240. Vermont: Willoughby Mt., *Eggleston*, no. 2177 (from type station, acc. to label); Willoughby cliffs, August 10 and 12, 1883, July 24, 1886, *Faxon;* North Slide, Willoughby Mt., August 15, 1896, *Faxon;* base of Willoughby Mt., July 3, 1894, *Grout & Eggleston*, August 1, 1894, *Williams;* 4th of July Slide, Willoughby, July 1, 1896, *Kennedy*, August 15, 1896, *Faxon;* Smuggler's Notch, Mt. Mansfield, August 9, 1877, *Faxon*, July 10, 1894, *Eggleston;* dry ledge, South Burlington, June 27, 1912, *Knowlton*. Massachusetts: Pettingill's swamp, Newbury, August 12, 1897, *A. A. Eaton;* rocky woods, Shelburne Falls, July 6, 1921, *Churchill;* limestone hill near Harmon Pond, Sheffield, *Hoffmann*. Connecticut: dry rocky woods (granitic), Sharon, *Weatherby*, no. 4799; dry rocky open woods (granitic), Canaan, *Weatherby*, no. 4145. New York: Wallface Mt., alt. 3000 ft., *House*,

no. 9533; Dutchess Co., *Hoysradt;* Watertown (as *A. repens*, var. *glaucum*) *A. Gray*, N. Am. Gram. Cyp. no. 128; Brownsville, June 30, 1859, *Wm. Boott;* dry open woods, Danby, *Eames & MacDaniels*, no. 3564. ONTARIO: Britannia, *Malte*, no. 119,242; Kingston, July 27, 1897, *Fowler;* Peninsula, Lake Superior, *Malte*, no. 107,866. MICHIGAN: Isle Royale, *Cooper*, no. 176; Alpena, July 22, 1876, *H. Gillman;* Cheboygan, August, 1890, *Kofoid.* WISCONSIN: Solon Springs, August 14, 1915, *Allen & Davis.* MANITOBA: Lake Winnipeg Valley, 1857, *Bourgeau.* MINNESOTA: sand, aspen grove, North Boundary, Hubbard Co., *M. L. Grant*, no. 2915; Duluth, August 1, 1888, *Vasey* (type of *A. tenerum ciliatum* Scribn. & Sm., consequently of *A. tenerum trichocoleum* Piper, *A. caninum*, var. *tenerum*, f. *ciliatum* (Scribn. & Sm.) Pease & Moore and *A. trachycaulum*, var. *trichocoleum* (Piper) Malte; type in U. S. Nat. Herb.). SASKATCHEWAN: Whitehorse Lake, *Herriot*, no. 72,890; Carleton House, *Richardson.* SOUTH DAKOTA: Belle Fourche, *Griffiths*, no. 389a. NEBRASKA: Loup City, *J. M. Bates*, no. 5219. ALBERTA: Cataract Creek, *S. Brown*, no. 1482; Edmonton, *Malte*, no. 151,819; near Banff, July 14, 1891, *J. Macoun.* WYOMING: Pine Bluffs, *Nelson*, no. 3628, in part; steep slopes, Bridger Peak, *Goodding*, no. 1939; Bull Camp, Big Horn Mts., *T. A. Williams*, no. 2771. COLORADO: Arboles, *Baker*, no. 145; vicinity of Mt. Carbon, *Tidestrom*, nos. 3918, 4041. NEVADA: Ruby Valley, alt. 6000 ft., *Watson*, no. 1330; grassy flats, alt. 6300 ft., Gold Creek, *Nelson & Macbride*, no. 2096.

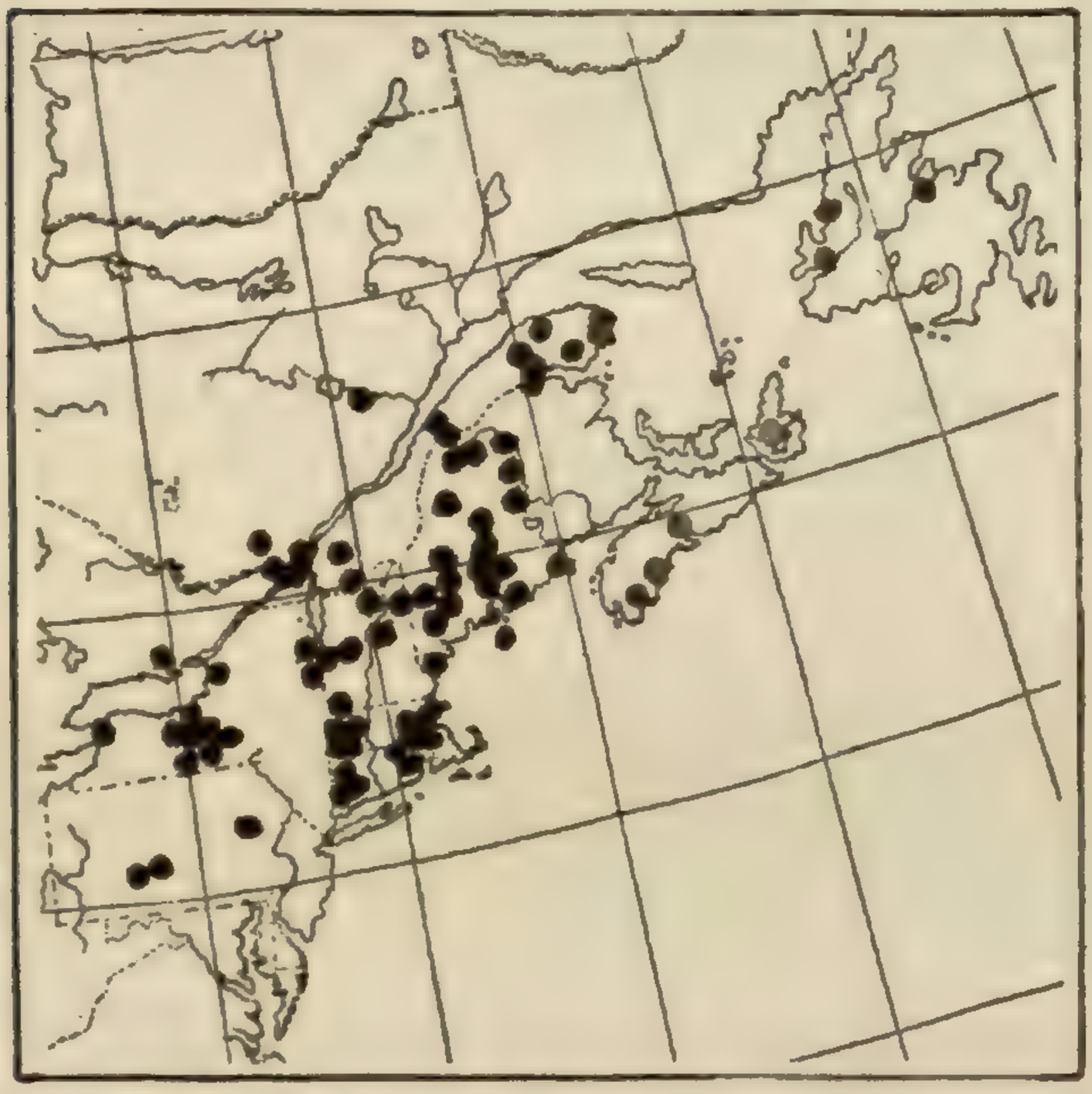
The individuals with trichomes present on some sheaths or blades have been called:

A. tenerum ciliatum Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 30 (1897). *A. tenerum trichocoleum* Piper, Bull. Torr. Bot. Cl. xxxii. 546 (1905). *A. caninum*, var. *tenerum*, f. *ciliatum* (Scribn. & Sm.) Pease & Moore, RHODORA, xii. 72 (1910). *A. caninum*, var. *Hornemanni*, f. *pilosifolium* Pease & Moore, l. c. 75 (1910). *A. trachycaulum*, var. *trichocoleum* (Piper) Malte, Ann. Rep. 1930, Nat. Mus. Can. 45 (1932).

The frequent glaucous state has apparently received no special designation.

Var. GLAUCUM (Pease & Moore) Malte, Ann. Rep. 1930, Nat. Mus. Can. 47 (1932). *A. caninum*, f. *glaucum* Pease & Moore, RHODORA, xii. 71 (1910). *A. trachycaulum*, var. *caerulescens* Malte, l. c. (1932). PLATE 244, FIGS. 1–4, and MAP 18.—Rocky or gravelly shores, thickets, open woods and bogs, in basic to acid soils, Newfoundland to southern British Columbia, south to southern New England, Pennsylvania, Michigan, Wisconsin, Minnesota, Nebraska, Colorado, Nevada and California. From a large representation the following are cited as characteristic. NEWFOUNDLAND: ledges, talus and gravel by Exploits R., Bishop Falls, *Fernald & Wiegand*, no. 4684; shelves and talus of diorite cliffs, Western Head, Bonne Bay, *Fernald, Long &*

Fogg, no. 1284; boggy woods, Stephenville, *Fernald & Wiegand*, no. 2691. Quebec: St. John (or Douglastown) R., August 23, 1904, *Collins, Fernald & Pease;* sur les graviers, R. Dartmouth, *Victorin et al.*, no. 17,832; gravelly beach of R. Ste. Anne des Monts, *Fernald & Collins*, nos. 170, 170a; gravelly beaches and flats, Bonaventure R., August 5–8, 1904, *Collins, Fernald & Pease;* sur les graviers de la rivière, Matapedia, *Victorin*, no. 26,464; slaty ledges by Matapedia R., Assemetquagan, *Fernald & Pease*, no. 24,911; rocky bank, St. Alphonse, Chicoutimi Co., August 6, 1902, *Williams & Fernald;* margin of Bic R., Bic, *Fernald & Collins*, no. 915; Rivière du Loup, 1860, *Chas. Pickering*, July 21, 1861, *Wm. Boott;* Anse à Persil, Rivière du Loup, *Victorin*, no. 98; shore of Boundary Lake, Kamouraska, July 31, 1878, *Pringle, Horsford;* Buckingham, *Malte*, no. 119,244; Ile Lemieux, R. Ottawa, *Victorin*, no. 15,262; pinière de la Trappe, Oka, *Victorin & Rolland*, no. 33,140; dry woods, Mt. Beloeil, *Pease*, no. 12,953; Elephantis Landing, Brome, *Pease*, no. 147. Nova Scotia: thicket at upper border of gravel beach, Great Bras d'Or, Kidstone I., *Fernald & Long*, no. 20,100; thickets and upper border of shingly beach, Shubenacadie Grand Lake, *Fernald, Bartram & Long*, nos. 23,338, 23,339; wet thickets and swales, Lahave R., Bridgewater, *Fernald & Long*, no. 23,341; crest of barrier beach, East Jordan, *Fernald & Long*, no. 23,340. New Brunswick: Junction of Matapedia and Restigouche Rivers, *Malte*, nos. 119,249, 119,251; Grand Falls, August 13, 1873, *Wm. Boott;* Lily Lake, St. John, August 10, 1873, *Wm. Boott*. Maine: shore of St. John R., Fort Kent, *Pease*, no. 2579; gravelly shores, Aroostook R., Fort Fairfield, *Fernald*, no. 196; cedar swamp, Mars Hill, *Fernald*, no. 575; recent clearings and railroad embankments, Houlton, *Fernald & Long*, no. 12,728; open woods, City Camp to Roebar's, Wassataquoik R., July 17, 1900, *Fernald;* argillaceous ledges by Penobscot R., Winn, *Fernald & Long*, no. 12,727; bogs, Oldtown, July, 1890, *F. P. Briggs;* exposed argillaceous ledges along Penobscot R., Hampden, *Fernald & Long*, no.



Map 18. Eastern Range of Agropyron trachycaulum, var. glaucum.

12,731; thicket above springy, limy gravel-beach of St. John R., Township ix, Range 17, Somerset Co., *St. John*, no. 2142; dry river-thicket, Mercer, August 6, 1913, *Knowlton;* open woods, Farmington, *Fernald*, no. 574; thin soil on ledges, Hartford, *Parlin*, no. 1427; calcareous strand, Kelly Point, Pembroke, July 31, 1909, *Fernald*, no. 1367 (TYPE of *A. caninum*, f. *glaucum* Pease & Moore, consequently of *A. trachycaulum*, var. *glaucum* (Pease & Moore) Malte); crevices of dry granite, Kelly Point, Pembroke, *Fernald*, no. 1368; rocks, Winter Harbor, *Stebbins*, no. 3913; deciduous hillside-woods, Dedham, *Fernald & Long*, no. 12,729; granite ledges, Frankfort, *Fernald & Long*, no. 12,730; wet bank in woods, Rockland, *C. A. E. Long*, no. 662; crevices of cliff, Monhegan Island, August 10, 1921, *Churchill;* wooded terrace of Kennebec R., Vassalboro, *Fernald*, no. 12,726; North Berwick, *Parlin*, no. 571. NEW HAMPSHIRE: railroad embankment, Randolph, *Pease*, nos. 16,887, 17,195, 19,847; near Upper Baker Pond, Piermont, August 1, 1908, *Williams*. VERMONT: Willoughby, July 21, 1898, *Kennedy;* Twin Mt., West Rutland, *Eggleston*, no. 2473; serpentine outcrop, Roxbury, July 18, 1916, *E. J. Winslow;* cliffs, North Pownal, August 1, 1898, *Churchill*. MASSACHUSETTS: Major Heywood path, Concord, July 1, 1859, *H. D. Thoreau;* Conantum Cliff, Concord, *E. S. Hoar;* dry rocky (diorite) hillside-woods, Horn Pond Hill, Woburn, *Fernald & Long*, no. 8815; rock in woods, Stoneham, July 4, 1894, *W. P. Rich;* High Rock woods, Needham, June 22, 1890, *T. O. Fuller;* damp thicket east of Morse's Pond, Wellesley, July 20, 1912, *Wiegand;* Neponset meadows, Canton, June 22, 1899, *Kennedy;* woods, Ashfield, July 19, 1909, *Williams;* dry rocky upland woods, North Adams, *Fernald & Long*, no. 8816; rocky summit, West Stockbridge Mt., July 18, 1911, *Hoffmann;* rocky ledge, slope of Monument Mt., Great Barrington, July 6, 1906, *Hoffmann;* limestone ledge, Sheffield, July 30, 1914, *Hoffmann*. CONNECTICUT: Wauregan, *J. L. Sheldon*, no. 657; dry thicket, Somers, July 20, 1904, *Bissell;* roadside bank, Union, *Weatherby*, no. 4776; moist meadow, Waterbury, *Blewitt*, no. 324; dry ledge, Waterbury, *Blewitt*, no. 3637; low wet field, Brookfield, *Blewitt*, no. 1885; sphagnous swampy meadow, Bethel, *Eames*, no. 10,973. NEW YORK: thin soil on rocks, Peaked Mt., West Fort Ann, July 16, 1918, *Burnham;* Glen Lake, September 20, 1916, *Burnham;* Axton, July 14, 1899, *Rowlee, Wiegand & Hastings;* Watertown, *A. Gray*, N. Am. Gram. Cyp. no. 129; open woods, Thatcher's Pinnacle, Danby, *Metcalf*, no. 5850; dry woods, Estey's Glenn, Lansing, *Metcalf*, no. 5848; dry scrubby hillside, Caroline, *Wiegand*, no. 9283; rocky banks, Enfield, *Metcalf*, no. 5849; open woods, Ithaca, *Metcalf*, no. 5847; Sullivan Hill (on some labels "Crest of Mt. Zoar"), Chemung Co., *T. F. Lucy*, no. 11,603; Penn Yan, *Sartwell;* marl openings, Bergen Swamp, *Wiegand*, no. 9282; Buffalo, *Clinton;* Niagara Falls, July, 1836, *Carey*. PENNSYLVANIA: Pocono Mts., August 2, 1860, *Porter;* (Porter, on his label, also reports it from barrens of Huntingdon Co. and from Blair

Co.). Ontario: dry rocky ground, Hastings Co., June 2, 1865, *J. Macoun;* beach of Agawa R., Frater, *Pease*, no. 18,068. Michigan: Isle Royale, *Cooper*, no. 175; bluffs, Keweenaw Co., *Farwell*, no. 760; Sulphur I., Thunder Bay, July 13, 1895, *C. F. Wheeler;* low sandy woods, Bay Port, September 10, 1902, *C. R. Ball;* very dry and poor ground in woods, Sand Point, Huron Co., *C. K. Dodge*, no. 22; Jackson, July 11, 1838, *Houghton*. Wisconsin: beach of L. Michigan, Sturgeon Bay, *Schuette*, no. 155; Scott, Brown Co., July 10, 1898, *Schuette;* river-bank, Allouez, July 17, 1882, *Schuette;* Beloit, 1860, *T. J. Hale;* Wild Rose, July 3, 1918, *J. J. Davis*. Minnesota: sand, aspen clearing, Clearwater Co., *M. L. Grant*, no. 3119; rocks, Thomson, *Sandberg*, no. 407; wooded slope, sandstone outcrop, Sheldon Valley, *Rosendahl*, no. 3816. Nebraska: wet meadow, near Whitman, Grant Co., *Rydberg*, no. 1617. Alberta: small meadow, Buffalo Prairie, Jasper Park, *J. M. Macoun*, nos. 98,043, 98,044; N. E. Branch of Saskatchewan, *S. Brown*, no. 1497; Banff, *Malte*, no. 108,310 (var. *caerulescens* Malte, cited by him). Montana: East Gallatin swamps, alt. 5000 ft., *Rydberg*, no. 3191. Wyoming: Cache Creek, *Tweedy*, no. 625; Sundance, *T. A. Williams*, no. 2862; Fort Bridger, August 5, 1873, *Porter*. Colorado: Twin Lakes, *J. Wolf*, no. 1168; Canyon City, alt. 5300 ft., Fremont Co., *Shear*, no. 960; dry soil among bushes, alt. 7000 ft., Mancos, *Baker, Earle & Tracy*, no. 440. Idaho: dry soil among rocks, St. Anthony, *Merrill & Wilcox*, no. 130. Nevada: King's Canon, alt. 1700–2000 m., Ormsby Co., *Baker*, no. 1286. California: open woods, Idyllwild, San Jacinto Mts., *M. F. Spencer*, no. 1231. Washington: dry slopes near Conconully, Okanogan Co., *J. W. Thompson*, no. 6941. British Columbia: Cameron Lake, Vancouver I., *W. R. Carter*, no. 950; Comox, Vancouver I., *Malte*, no. 107,855 (type of var. *caerulescens* Malte).

The earliest varietal name applicable to the common American *Agropyron "caninum"* is var. *glaucum*, a bit innappropriate, since most of the material is not strikingly, if at all, glaucous. The common, green and glabrous phases of the plant are:

A. caninum of most American authors, not *A. caninum* (L.) Beauv. of Eurasia.

Triticum subsecundum Link, Hort. Bot. Berol. ii. 190 (1833).

Individuals of the green plant with more or less pubescence on some of the sheaths or blades have been called *A. caninum*, f. *pubescens* Pease & Moore, l. c. (1910). The plants examined by them have glabrous culms and variable, though not excessive pubescence on the foliage. They took their name from *A. caninum pubescens* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 29 (1897). The type of Scribner & Smith's subspecies, most kindly loaned me by Professor Hitchcock, is a very extreme variation, if not another species, quite

Inflorescences, × 1. FIG. 1, AGROPYRON REPENS; FIG. 2, A. REPENS, forma ARISTATUM; FIG. 3, A. REPENS, var. SUBULATUM; FIG. 4, var. SUBULATUM, forma VAILLANTIANUM; FIG. 5, A. PUNGENS.

unlike anything else which I have seen: with blades and sheaths all densely villous-tomentose, the tomentum also on the culms. No other material of the aggregate *A. trachycaulum* has been seen with positively pubescent culms. In view of the constancy of this character in species of *Muhlenbergia, Bromus*, and in some other genera of the *Gramineae* the rare western plant deserves further attention.

Var. UNILATERALE (Cassidy) Malte, Ann. Rep. 1930, Nat. Mus. Can. 46 (1932), in part (including name-bringing synonym). *A. Richardsoni* Schrad. Linnaea, xii. 467 (1838). *A. unilaterale* Cassidy, Colo. State Agric. Coll. Expt. Sta. Bull. no. 12: 63 (1890), not *A. unilaterale* Beauv. Agrost. 102 (1812). *A. caninum*, var. *unilaterale* (Cassidy) Vasey, Contrib. U. S. Nat. Herb. i. 279 (1893). *A. caninum*,

Map 19. Eastern Range of AGROPYRON TRACHYCAULUM, var. UNILATERALE.

f. *violascens* Ramaley, Geol. Nat. Hist. Surv. Minn.—Minn. Bot. St. no. 9: 3, 107 (1894). *A. violaceum*, f. *caninoides* Ramaley, l. c. 9, 108 1894). *A. violascens* (Ramaley) Beal, Grasses N. Am. ii. 635 (1896). *A. caninoides* (Ramaley) Beal, l. c. 640 (1896). *A. caninum*, var. *Richardsoni* (Schrad.) M. E. Jones, Contrib. West. Bot. xvi. 18 (1912). *A. trachycaulum*, var. *Richardsoni* (Schrad.) Malte in H. F. Lewis, Can. Field-Nat. xlv. 201 (1931). PLATE 244, FIGS. 5–7, and MAP 19.—Meadows, thickets and limy rocks, borders of Gulf and lower River St. Lawrence, Quebec; Ontario and western New York to British Columbia, south to Wisconsin, Iowa, South Dakota, Colorado, Nevada and Oregon. QUEBEC: sur les platières, Riv. au Saumon, Anticosti, *Victorin & Rolland*, no. 27,886, as *A. repens;* sur les talus secs, R. Natiskotek, Anticosti, *Victorin & Rolland*, no. 27,895 (transition to var. *majus*); alluvial islands at mouth of Bonaventure R., August 4, 1904, *Collins, Fernald & Pease;* sur les ilôts cambriens dits "Les Razades," Trois Pistoles, *Victorin, Rolland & Jacques*, no. 34,008;

vicinity of Cap à l'Aigle, *J. Macoun*, no. 68,982 (approaching var. *glaucum*). Maine: in agris (doubtless introduced in western wool[1]), North Berwick, June 24, 1898, *Parlin*. New York: Buffalo, *Clinton*. Ontario: Kemptville, *Malte*, no. 119,243. Wisconsin: railroad track to Murphy's mill, Green Bay, July 8, 1897, *Schuette;* Scott, Brown Co., June, 1885, *Schuette*. Iowa: Little Rock, *C. R. Ball*, no. 554; Jewell Junction, *G. W. Carver*, no. 255. North Dakota: prairies, Leeds, July 8, 1901, *Lunell*. South Dakota: Brookings, July 10, 1894, *Thornber*. Saskatchewan: without locality, 1858, *Bourgeau*. Alberta: Dunvegan, Peace R., *J. M. Macoun*, no. 59,546; Brazeau, *S. Brown*, no. 1432; Devil's Head Lake, August 3, 1891, *J. Macoun;* Banff, *Butters & Holway*, no. 313. Montana: dry hillsides, Hound Creek Valley, alt. 4500 ft., *Scribner*, no. 422 (cotype of *A. Richardsoni ciliatum* Scribn. & Sm., consequently of *A. caninum*, var. *unilaterale*, f. *ciliatum* (Scribn. & Sm.) Pease & Moore and of *A. trachycaulum*, var. *ciliatum* (Scribn. & Sm.) Malte); Dry Fork of Belt Creek, *Rydberg*, no. 3352 (one individual green, one glaucous). Wyoming: Laramie, *E. D. Merrill*, no. 23. Colorado: wet ground in the higher mountains, near Golden City, *Greene*, no. 446; Veta Pass, 1886, *Vasey;* Dillon, *Shear*, no. 1067; alpine, moist bottoms, Hahn's Peak, Routt Co., *Goodding*, no. 1705. Nevada: Incline, Lake Tahoe, *P. B. Kennedy*, no. 1439. Oregon: Dale's, Blue Mts., *Griffiths & Hunter*, no. 111. Washington: Loomis, *Griffiths & Cotton*, no. 340. British Columbia: Field, *J. Macoun*, no. 64,790; Comox, *J. Macoun*, no. 50.

Individuals with more or less pubescence on at least the lowest sheaths have been called:

A. Richardsoni ciliatum Scribn. & Sm. U.S. Dept. Agric. Div. Agrost. Bull. no. 4: 29 (1897). *A. caninum*, var. *unilaterale*, f. *ciliatum* (Scribn. & Sm.) Pease & Moore, Rhodora, xii. 76 (1910). *A. trachycaulum*, var. *ciliatum* (Scribn. & Sm.) Malte, l. c. 47 (1932).

Although Cassidy seems to have left no type (acc. to personal letter from Professor Ernest C. Smith) to stand for *Agropyron unilaterale*, his description can have been based on nothing else than the long-awned ("2 inches") *A. Richardsoni;* therefore, the inappropriate (or at least undistinctive) name *unilaterale*, as the first one used in the varietal category, has to be maintained.

The American Variations of Agropyron repens.—The ubiquitous *Agropyron repens* (L.) Beauv. is excessively variable and it has repeatedly been segregated into minor species and varieties. As it occurs in North America, apparently indigenous along the coast from

[1] Along with *Bromus marginatus* Nees, *Puccinellia Nuttalliana* (Schultes) Hitchc., *Bouteloua spp.*, *Chloris spp.*, *Sporobolus spp.*; *Monolepis chenopodioides* Moq., *Lappula Redowskii* (Hornem.) Greene, var. *occidentalis* (Wats.) Rydb., *Aster frondosus* (Nutt.) T. & G., *Hymenatherum aureum* Gray and many other western plants thus locally introduced.—See J. C. Parlin, Rhodora, vi. 81 (1904).

Newfoundland and the lower St. Lawrence to New England and introduced as an obnoxious weed in eastern Canada and the northeastern States and to a minor degree in the Northwest, it appears in several striking forms. Although conspicuous in their extremes, these all seem to intergrade; and essentially all of them may have either green or glaucous or pilose- or glabrous-sheathed phases. Such divergences are often very striking to the eye but as these tendencies are found indiscriminately in the awnless or long-awned, broad-glumed or narrow-glumed forms of the species I cannot look upon them as of taxonomic importance comparable with the variations of the spikelets.

Two very marked trends occur in the glumes. In the majority of weed-colonies in the East the glumes are oblong to narrowly elliptic and broadly scarious-margined (PLATE 245, FIGS. 1 and 2). In the larger mass of material of the sea-beaches, though sometimes in the weedy plants of the interior, the glumes are lanceolate and prolonged from near the middle to the tapering tip and with narrower or inrolling margins (FIGS. 3 and 4). In each of these series the rachis may be glabrous or pilose and the lemmas awnless or long-awned. It is, therefore, very difficult to interpret the many European descriptions which, emphasizing one point (the pilose rachis or the presence of awns, for instance), ignore the others. But, since it is desirable to have some names by which to designate our forms, I am appending the following wholly tentative arrangement of them, distinctly understanding that the names may eventually have to be altered, when a series is closely studied in connection with the European types. The two major trends I am treating as true varieties; the parallel variations under them seem better considered as forms.

a. Glumes oblong, rounded or rather abruptly narrowed at apex, with broad scarious margin....*b.*
  b. Rachis glabrous except for ciliate edges....*c.*
    c. Glumes and lemmas blunt, acute or merely subulate-tipped.....*A. repens* (typical).
    c. Glumes or especially the lemmas definitely awned..Forma *aristatum*.
  b. Rachis pilose or hirsute....*d.*
    d. Glumes and lemmas blunt, acute or merely subulate-tipped.....Forma *trichorrhachis*.
    d. Glumes and lemmas definitely awned.....Forma *pilosum*.
a. Glumes lanceolate, gradually tapering from near the middle to the apex; margin narrow or inrolled....*e.*
  e. Rachis glabrous except for ciliate edges....*f.*
    f. Glumes and lemmas blunt, acute or merely subulate-tipped Var. *subulatum*.
    f. Glumes and especially the lemmas definitely awned Forma *Vaillantianum*.
  e. Rachis pilose or hirsute....*g.*

g. Glumes and lemmas blunt, acute or merely subulate-tipped.....Forma *heberhachis*.
g. Glumes and lemmas definitely awned.....Forma *setiferum*.

A. REPENS (L.) Beauv. Agrost. 146 (1812). *Triticum repens* L. Sp. Pl. i. 86 (1753).—Gravelly coast, Newfoundland and eastern Quebec to Maine; a dominant and aggressive weed south to southern New England and west to Minnesota and Iowa; Alaska to California. (Eu.) PLATE 245, FIG. 1.

Forma ARISTATUM (Schum.) Holmb. Skand. Fl. hft. 2: 274 (1926). *Triticum repens*, var. *aristatum* Schum. Enum. Pl. Saell. ii. 38 (1803).—Coast, Newfoundland and eastern Quebec to southern New England; as a weed inland to Minnesota; Alaska to Oregon. PLATE 245, FIG. 2.

Forma TRICHORRHACHIS Rohlena, Böhm. Ges. Wiss. Math. Nat. Cl. no. xxiv. 5, 8 (1899). *Triticum repens*, var. β. *pubescens* Döll, Fl. Baden. 129 (1857), not M. Bieb. *A. repens*, sub-var. *pubescens* (Döll) Rouy, Fl. France, xiv. 317 (1913). *A. repens*, f. *pubescens* (Döll) Holmb. Skand. Fl. hft. 2: 274 (1926).—Newfoundland and Saguenay Co., Quebec to Connecticut and western New York; Oregon.

Forma **pilosum** (Scribn.) comb. nov. *A. repens*, var. *pilosum* Scribn. in Rand & Redfield, Fl. Mt. Desert, 183 (1894).—Gaspé Peninsula, Quebec to Connecticut and Michigan.

The material from Southwest Harbor upon which Scribner based his var. *pilosum* was partly awnless (f. *trichorrhachis*), partly awned. The specimens on the sheet bearing his annotations have long awns and I am designating this material as the type.

Var. SUBULATUM (Schreb.) Reichenb. Ic. Fl. Germ. i. t. xx. fig. 1385 (1834). *Triticum subulatum* Schreb. in Schweig. & Körte, Fl. Erl. i. 143 (1804).—Coast, Newfoundland and Saguenay Co., Quebec to Connecticut; and as a weed south to New Jersey and westward to Minnesota, Iowa and Missouri; Wyoming and Oregon. PLATE 245, FIG. 3.

Forma **Vaillantianum** (Wulf. & Schreb.), comb. nov. *Triticum Vaillantianum* Wulf. & Schreb. in Schweig. & Körte, Fl. Erl. i. 143 (1804). *A. repens*, var. *Vaillantianum* (Wulf. & Schreb.) Reichenb. Ic. Fl. Germ. i. t. xx. fig. 1387 (1834).—Sea-shores, Newfoundland and Magdalen Islands to Massachusetts; and as a weed to Pennsylvania and Wisconsin and in Washington and Oregon. PLATE 245, FIG. 4.

Forma **heberhachis**, f. nov., var. subulato simile, rhachi piloso.—Newfoundland to Rhode Island. TYPE: roadsides, waste places and ballast land, Yarmouth, Nova Scotia, July 24, 1920, *Long & Linder*, no. 20,091 (in Gray Herb.).

Forma **setiferum**, f. nov., forma *Vaillantiano* simile, rhachi piloso.—On the coast, Newfoundland to Long Island, inland to saline soils of western New York. TYPE: Chelsea Beach, MASSACHUSETTS, July 15, 1868, *Wm. Boott* (Gray Herb.).

The Newfoundland specimens of these varieties and forms of *Agropyron repens* before me are the following.

A. REPENS (L.) Beauv. (typical). AVALON PENINSULA: Murray's Pond, 1932, *A. M. Ayre;* INGORNACHOIX BAY: damp shores, Port Saunders, *Fernald, Wiegand & Kittredge,* no. 2679. BAY of ISLANDS: door yard, Frenchman's Cove, *Mackenzie & Griscom,* no. 10,100.

*A. REPENS, f. ARISTATUM (Schum.) Holmb. PORT AU PORT BAY: sand flats back of beach, 4 miles north of Port au Port, *Mackenzie & Griscom,* no. 10,101. BAY ST. GEORGE: dry sand, Stephenville Crossing, *Mackenzie & Griscom,* no. 10,104*a*.

*A. REPENS, f. TRICHORRHACHIS Rohlena. AVALON PENINSULA: roadsides, St. John's, August 4, 1894, *Robinson & Schrenk.* PORT AU PORT BAY: sandy ground back of beach, 4 miles north of Port au Port, *Mackenzie & Griscom,* no. 10,101*a*. BAY ST. GEORGE: dry sand, Stephenville Crossing, *Mackenzie & Griscom,* no. 10,104.

*A. REPENS, var. SUBULATUM (Schreb.) Reichenb. AVALON PENINSULA: Colinet, 1932, *A. M. Ayre.* VALLEY OF THE GANDER: dry gravelly railroad bank, Glenwood, *Fernald, Wiegand & Darlington,* no. 4682. ST.-PIERRE ET MIQUELON: sables et galets maritimes, Dunes du Grand Étang de Miquelon, *Arsène,* no. 84.

*A. REPENS, var. SUBULATUM, f. VAILLANTIANUM (Wulf. & Schreb.) Fern. AVALON PENINSULA: Murray's Pond, 1932, *A. M. Ayre.* BONNE BAY: thicket bordering marl-pond, Storehouse Cove, *Fernald, Long & Fogg,* no. 1279.

*A. REPENS, var. SUBULATUM, f. HEBERHACHIS Fern. BAY OF ISLANDS: wet openings in woods at about 900 ft. alt., Blomidon, *Eames & Godfrey,* no. 5877.

*A. REPENS, var. SUBULATUM, f. SETIFERUM Fern. VALLEY OF THE EXPLOITS: ledges and talus, Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* no. 4683.

(To be continued)

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 185*)

Nardus stricta L. The Newfoundland record has rested upon *Robinson & Schrenk*, no. 209, from rocky banks of Rennie's River, St. John's. Mrs. Ayre now sends material from the Newtown Marsh near St. John's, as also from Quidi Vidi and banks of Waterford River —all in the same general area; also from the marshes of Beaver Pond, Salmonier.

*Avena fatua L. Apparently becoming a rather general weed in Newfoundland, as elsewhere in eastern America. Mrs. Ayre gets it in old fields and waste places on the Avalon Peninsula. Our collection from the West Coast is from Bonne Bay: bushy margin of cultivated clearing, Middle Brook, *Fernald, Long & Fogg.* no. 1287.

Sphenopholis pallens (Spreng.) Scribn. The northernmost station yet known in on Bonne Bay: limestone cliffs and talus, Tucker's Head, *Fernald, Long & Fogg*, no. 1295.

Deschampsia atropurpurea (Wahlenb.) Scheele. Additional station on the Highlands of St. John: peat on quartzite slopes, head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1297.

*Agrostis Rossae Vasey. Bonne Bay: rocky soil, August 1, 1930, *K. P. Jansson.*

This is the first station in eastern America for a characteristic little species (with very short-tufted leaves and dense linear-cylindric panicles, with spikelets about 2 mm. long) of the cordilleran region from Wyoming and Colorado to British Columbia and California. Its discovery at Bonne Bay is a clear indication of the need of further work there. Our party of 1929 did not see it; neither did Mr. Jansson find many of the localized species seen by us. He made his center at Lomond and in his brief stay reached areas we did not visit.

The Variations of Agrostis borealis.—The species generally known as *Agrostis borealis* Hartm. presents in eastern North America

three strikingly different variations, which by some botanists have been considered distinct species, by others as of not even formal value. In Newfoundland all three occur and in their best development they are so distinct that they have been heretofore regarded by me as three species; but with the accumulation of much material it becomes apparent that their characters are intergradient and that they have no fundamental morphological distinctions. As geographic varieties, however, they are tolerably definite; and their distinguishing characters are enumerated below.

a. Lemma awned: branches of mature panicle spreading-ascending.
Spikelets (glumes) 2–3 (av. 2.6) mm. long: culms 0.4–4.5 dm. high: leaf-blades 0.2–2 mm. broad, flat or more commonly involute: panicle 1.5–14 cm. long.....Var. *typica.*
Spikelets (glumes) 2.8–4 (av. 3.3) mm. long: culms 1.5–7.5 dm. high: leaf-blades 1–4 mm. broad, flat: panicle 3–17 cm. long.....Var. *americana.*
a. Lemma awnless: branches of mature panicle strongly ascending: spikelets 2.8–4.6 (av. 3.6) mm. long: culms 0.2–3.5 dm. high: leaf-blades 0.2–2 mm. broad, flat or involute: panicle 1–10 cm. long.....Var. *paludosa.*

A. BOREALIS Hartm., var. **typica.** *A. borealis* Hartm. Skand. Fl. ed. 3: 17 (1838); Hitchcock, N. Am. Sp. Agrostis—U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68: 52 (1905), in large part (1905). *A. Mertensii* Trin. Mém. Acad. St. Pétersb. sér. 6, vi² 331 (1841). *A. canina,* var. *alpina* Oakes, Cat. Pl. Vermont, 32 (1842). *A. canina,* var. ? *tenella* Torr. Fl. N. Y. ii. 443 (1843). *A. concinna* Tuckerm. Hovey's Mag. Hort. ix. 143 (1843) and Am. Journ. Sci. xlv. 42 (1843). *A. Pickeringii, β. rupicola* Tuckerman, Am. Journ. Sci. l. c. (1843). *Trichodium concinnum* (Tuckerm.) Wood, Cl.-Bk. ed. 2: 600 (1847).—Northern Eurasia; northern North America from Greenland and Labrador to the higher mountains of Maine, New Hampshire, northern Vermont and northern New York; Alaska and British Columbia. The following, selected from a large representation, are typical. LABRADOR: Nachvak, *Sornborger,* no. 244; Hopedale, *Sornborger,* no. 225; Anatolak, *Sewall,* nos. 425, 440, 442, 444; Nain, *Sewall,* no. 92, *Bishop,* no. 59. NEWFOUNDLAND: Little Quirpon, *Fernald & Long,* no. 27,474; summit, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss,* no. 27,473; Deer Pond Brook, Highlands of St. John, *Fernald & Long,* no. 27,475; dry meadow on tableland of Doctor Hill, *Fernald, Long & Fogg,* no. 1309; serpentine tableland, Bonne Bay, *Fernald & Wiegand,* no. 2526, *Fernald, Long & Fogg,* no. 1312; limestone cliffs near Stanleyville, *Fernald, Long & Fogg,* no. 1311; Lark Mountain, *Fernald, Long & Fogg,* no. 86; Blow-me-down Mts., *Eames & Godfrey,* nos. 5829, 5831; Harry's River, *Fernald & Wiegand,* no. 2524. QUEBEC: Blanc Sablon ("Labrador"), *Fernald & Wiegand,* no. 2522; Tabletop Mts., *Fernald & Collins,* no. 389; Mt. Dunraven,

AGROSTIS SCABRA, var. SEPTENTRIONALIS: FIG. 1, portion of panicle, × 1, from Bonne Bay, Newfoundland; FIG. 2, mature spikelets, × 6.

A. HYEMALIS: FIG. 3, young panicle, × 1, from Pennsylvania; FIG. 4, mature panicle, × 1, from New York; FIG. 5, mature spikelets, × 6, from Illinois.

Tabletop Mts., *Fernald, Dodge & Smith,* no. 25,483; Coulée des Fourches, Mt. Albert, *Victorin, Rolland, Brunel & Rousseau,* no. 17,814; Little Cascapedia River, *Collins, Fernald & Pease*, no. 4931; Le Bicquet, Co. Rimouski, *Rousseau,* no. 30,039. MAINE: Mt. Katahdin, *A. Young et al.;* Mt. Bigelow, *Fernald & Strong,* no. 487. NEW HAMPSHIRE: White Mts., "In alpibus," as *A. concinna, Tuckerman* (TYPE or duplicate type of *A. concinna*); alpine region, White Mts., *Oakes,* as *A. canina,* var. *alpina* Oakes; and many subsequent collections from the mountains of Coös and Grafton Cos., including the following somewhat widely distributed numbered ones: Mt. Washington, *Robinson,* no. 981; *Hitchcock,* Amer. Gr. Nat. Herb. no. 443; Mt. Lafayette, *Fernald* in Pl. Exsicc. Gray. no. 117. VERMONT: Mt. Mansfield, *Pringle, Faxon et al.* NEW YORK: Whiteface Mt., *Hitchcock,* Amer. Gr. Nat. Herb. no. 442; Mt. McIntyre, *House,* no. 9493. ALASKA: Nome, *Hitchcock* in Amer. Gr. Nat. Herb. no. 348 (no. 347 of the same series, as represented in the Gray Herbarium is not *A. borealis*). BRITISH COLUMBIA: small peak above timber line, Selkirk Mts., *Shaw,* no. 1019, as *A. varians.*

Forma **macrantha** (Eames), n. comb. Var. *macrantha* Eames, RHODORA, xi. 88 (1909).—Spikelets proliferating or "viviparous." Perhaps pathogenic. NEWFOUNDLAND: Blow-me-down Mts., *Eames & Godfrey,* no. 5833 (TYPE collection); Lark Mountain, *Fernald, Long & Fogg,* no. 87. QUEBEC: Rivière Mingan, *Victorin & Rolland,* no. 24,754. NEW HAMPSHIRE: Alpine Garden, Mt. Washington, *Pease,* no. 1742.

*Var. **americana** (Scribn.), n. comb. *A. Pickeringii* Tuckerm. Hovey's Mag. Hort. ix. 143 (April, 1843), Am. Journ. Sci. xlv. 42 (April–June, 1843), excl. *β. rupicola. A. rupestris* Chapm. Fl. So. U. S. 551 (1860), not All. *A. novae-angliae* Vasey, Contr. U. S. Nat. Herb. iii. 76 (1892), in part (excl. synonym), not Tuckerm. *A. rubra,* var. *americana* Scribn. Grasses of Tenn. pt. ii. 77, t. xxv. fig. 100 (1894).—Western Newfoundland and eastern Quebec to mountains of Maine and New Hampshire; Roan Mt., North Carolina and Tennessee. The following are characteristic. NEWFOUNDLAND: Overfall of Deer Pond Brook, Highlands of St. John, *Wiegand, Gilbert & Hotchkiss,* no. 27,476, no. 27,477 (with habit of var. *paludosa*); Southwest Gulch, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss,* no. 27,478; Yellow Brook, Doctor Hill, *Fernald, Long & Fogg,* no. 1313. QUEBEC: Blanc Sablon ("Labrador"), *Fernald & Wiegand,* no. 2523; Lac du Vieillard, Gaspé Co., *Fernald, Dodge & Smith,* no. 25,484; River Ste. Anne des Monts, *Fernald & Collins,* no. 414; Cap Chat River, *Fernald & Pease,* no. 24,856; Mt. Fortin, *Fernald & Pease,* no. 24,857; Grand Cascapedia River, July 12–15, 1905, *Williams, Collins & Fernald.* MAINE: on Saddle Slide, in Great Basin and by Chimney Pond, Mt. Katahdin, July 10–13, 1900, *Fernald.* NEW HAMPSHIRE: White Mts., *E. Tuckerman* (TYPE or duplicate type of *A. Pickeringii* Tuckerm.; "in monte Great Hay-

stack," *Tuckerman;* margins of alpine brooks, White Mts., September 1, 1877, *Pringle* (TYPE collection of *A. novae-angliae* Vasey, acc. to Hitchcock, U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68: 53); Lake of Clouds, Mt. Washington, *Faxon, Fuller, Williams et al.;* Oakes Gulf, Mt. Washington, *Faxon;* Tuckerman's Ravine, Mt. Washington, *Faxon et al.;* Cape Horn, Mt. Washington, *Faxon, Churchill;* Great Gulf, Mt. Washington, *Faxon;* Boott's Spur, Mt. Washington, *Williams;* Mt. Monroe, September 8, 1862, *Wm. Boott;* Mt. Lafayette, July 29, 1863, *Wm. Boott;* Eagle Cliff, Franconia, *Fernald & Smiley,* no. 11,533. NORTH CAROLINA: "In monte Roan dicto," July, 1841, *Gray & Carey,* labeled and reported (Am. Journ. Sci. xlii. 42 (1842)) without description as *A. rupestris;* Roan Mt. July, 1889, Scribner (TYPE collection of *A. rubra,* var. *americana*).

Agrostis canina, var. ? *tenella* was described by Torrey from "Mountains in the northern part of the State [of New York]," with "leaves linear, flat . . . a little more than a line wide." It might have been var. *americana,* but the description is quite as satisfactory for a well grown var. *typica.* The latter is the only form seen from the Adirondacks and Dr. E. D. Merrill informs me that Torrey apparently preserved no specimen to stand for his *A. canina,* var. ? *tenella.* I am, therefore, leaving it with typical *A. borealis.*

Agrostis rubra, var. *americana* was clearly published by Scribner in his Grasses of Tennessee (1894), with a good description, clear illustration and the citation of *A. rupestris* Chapm., not All., as a synonym. It was known to Scribner only from "Near the summit of Roane mountain." Var. *americana* had had an earlier but invalid publication in synonymy. In his Catalogue of Canadian Plants, ii. 391 (1890) Macoun published the following note:

> (2763.) **A. canina,** Linn.; Macoun, Cat. IV., 198.
> Prof. Scribner says of this species: "This is *A. rubra,* Linn. May be called *A. rubra,* Linn., var. *Americana.* It is the same as *A. rupestris,* Chapm. (non All.), found on Roan Mountain, North Carolina. The same plant grows on the White Mountains of New Hampshire (*A. canina,* var. *alpina,* Oakes) together with the true *A. rupestris* All." (Scribner.) Our specimens from Mount Albert, Gaspé, Q., belong to *A. rubra,* var. *Americana.* (*Macoun.*)

Macoun's publication may be viewed in different ways. It may be said that he published *A. rubra,* var. *americana* in synonymy (under *A. canina*), in which case he gave it no nomenclatural status; consequently Scribner's later account was the first *valid* publication of the name. If it be maintained that Macoun's publication was valid, then the only characterization of the new variety is Chapman's description of the Roan Mt. plant as *A. rupestris.* In either case the result

is the same; the Roan Mt. plant has the large spikelets of *A. Pickeringii* Tuckerm. and *A. novae-angliae* Vasey, not Tuckerm., though it is a low and narrow-leaved form.

Var. **paludosa** (Scribn.), n. comb. *A. paludosa* Scribn. U. S. Dept. Agric. Div. Agrost. Bull. no. 11: 49 (1898); Hitchc. U. S. Dept. Agric. Bur. Pl. Ind. Bull. 68: 53, 54, fig. 2 (1905); Fernald, RHODORA, XXVIII. 118, 161 (1926). *A. melaleuca* Fernald, l. c. 63, 109, 161 (1926), not Hitchc.—Labrador, northwestern Newfoundland and eastern Saguenay Co., Quebec. LABRADOR: rocky beach, Tikkoatokok Bay, lat. 57°, *Bishop*, no. 58. NEWFOUNDLAND: springy swale south of the Hospital, Flower Cove, *Fernald, Long & Dunbar*, no. 26,280 as *A. melaleuca;* boggy swale near the Rock Marsh, Flower Cove, *Fernald, Pease & Long*, no. 27,481, *Fernald*, no. 27,483, both as *A. melaleuca;* dripping quartzite cliffs and ledges, upper Deer Pond Brook, Highlands of St. John, *Fernald & Long*, no. 27,482, as *A melaleuca;* dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,479 (starved specimen); dry gravelly limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 1308 (starved specimen). QUEBEC: in barren spots on the gneiss plain, Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2528 (the type was collected by Waghorne at Blanc Sablon); sand-dunes, Blanc Sablon River ("Labrador") *Fernald, Wiegand & Long*, no. 27,480; "Labrador," *Martin;* rocky crest, Ile Ouapitagone, *St. John*, no. 90,123.

Fernald, Long & Dunbar, no. 26,253 from Flower Cove, Newfoundland, and *Wiegand, Gilbert & Hotchkiss*, no. 27,477 from Deer Pond Brook, Newfoundland, have the panicle-branches strongly ascending as in var. *paludosa* but many of their lemmas are awned as in var. *americana*.

*AGROSTIS SCABRA Willd., forma **Tuckermani**, f. nov., lemmatibus aristigeris.—Rarely through the range of the typical awnless form, Newfoundland to New England. TYPE: sandy flats of Monatiquoit River, above Union Street, Braintree, Massachusetts, July 1, 1911, *J. R. Churchill* (in Gray Herb.). The Newfoundland collections are from CONCEPTION BAY: talus of sandstone cliffs, Western Bay, *G. S. Torrey*, no. 111. FORTUNE BAY: silicious gravelly slope, Harbour Breton, *Fernald, Long & Dunbar*, no. 26,250.

Agrostis scabra Willd. Sp. Pl. i. 370 (1798) is the plant which long correctly passed under that name. In 1905 it was merged by Hitchcock, N. Am. Sp. Agrostis (U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68), 42, with *A. hyemalis* (Walt.) BSP. Prelim. Cat. N. Y. 68 (1888), which, in turn, was based on *Cornucopiae hyemalis* Walt. Fl. Carol. 73 (1788). Walter lived at Santee, South Carolina; consequently it is natural to identify his *C. hyemalis* as a plant of eastern South Carolina.

According to Hitchcock there is no specimen preserved in the Walter herbarium but Walter's brief diagnosis well describes the common plant of South Carolina:

hyemalis. 1. culmo erecto, panicula diffusa verticillata, foliis angustis subteretibus [misquoted by Hitchcock "sub-erectibus"].

This, so far as it goes, sufficiently describes the species (PLATE 246; FIGS. 3, 4 and 5) of eastern Virginia, North and South Carolina, Georgia and Florida, which begins flowering in early spring (March and early April; northward, in New Jersey, southern New York and southern New England in May), the beautifully distinct species clearly characterized, 120 years after Walter, as *Agrostis antecedens* Bicknell, Bull. Torr. Bot. Cl. XXXV. 473 (1908). This southern early-flowering species (PLATE 246, FIGS. 3 and 4), with mostly involute-filiform leaves and very lax panicles mostly 0.5–2 (rarely –3) dm. long, has the filiform branches simple or forked only near the tip; the tiny spikelets (1.2–2 mm. long) subsessile or only short-pedicelled and crowded in close spiciform terminal glomerules 2–10 mm. long; the tips of the glumes distant in fruit (FIG. 5), thus exposing the grain; the lemma 0.5–1 mm. long; the tiny (about 0.2 mm. long) anthers round-ish. It is common from Florida to Texas, extending north on and near the Coastal Plain to Rhode Island and Massachusetts, and in the interior to Kansas, Iowa, Illinois and Indiana; it abounds in Walter's region.

Agrostis scabra is coarser throughout, with cauline leaves usually broader and flat; the panicle, when well developed much larger, with the branches forking lower down and in maturity gibbous at base; the spikelets mostly longer-pedicelled, 2–4.3 (in typical *A. scabra* 2–3) mm. long; the glumes connivent in fruit, covering the grain; the lemmas 1.3–2.5 (in typical *A. scabra* 1.3–2) mm. long; the anthers larger and elongate. *A. scabra* in its various forms abounds from Labrador and Newfoundland to Alaska, south to Pennsylvania, the Great Lakes states, Iowa, Nebraska, New Mexico, Arizona and California. In the region where its range meets that of *A. hyemalis* (*A. antecedens*), *A. scabra* begins flowering when the former is wholly mature, from late June to August. This mid-summer species does not reach Walter's country and the name *hyemalis* would be meaningless if applied to it; for a plant which begins flowering in March and which, in the South, is mature in April it is at least less inappropriate. Willdenow's

characterization of *A. scabra* was clearly based on the coarser and more northern plant: . . . "Folia *linearia* . . . Panicula *ramosa divaricata ampla, fere pedalis*," etc.

Agrostis scabra, f. *Tuckermani* is unquestionably the plant from "Notch of the White Mountains" described as *A. laxiflora, β montana* Tuckerm. Am. Journ. Sci. xlv. 43 (1843) "palea arista tortili exserta e medio dorsi proveniente praedita." Tuckerman's plant is in the Gray Herbarium but, unfortunately, he involved the typification by citing as its nomenclatural basis "*Trichodium montanum, Torr.* (*fide ips.*) *Torr. Fl.* i. 84." The original description of *T. montanum* Torr. Compend. 50 (1826) mentions no awn; and, although Hitchcock (N. Am. Sp. Agrost. 43) says "In the mountains of New England is a form which has awned spikelets. . . This form has been named —*Trichodium montanum* Torr., Comp. 50. 1826," he states very definitely that "Torrey's specimen is in the Torrey herbarium . . . the flowering glume is awnless" and the type of the "New England" plant was "collected on 'summit of the New Beacon, Fishkill [New York]'". With the typification of *A. laxiflora, β. montana* thus involved, it is wiser to redesignate the form of *A. scabra* with awned lemmas and to assign it an unequivocal type.

The name *Agrostis laxiflora* Richardson (1823) goes back to *Trichodium laxiflorum* Michaux, Fl. Bor.-Am. i. 42, t. 8 (1803). Michaux's plate shows very characteristic *A. hyemalis* (*A. antecedens*) and he cited as an unquestioned synonym *Cornucopiae hyemalis* Walt. *A. aphanes* Trin. Agrost. ii. 100 (1841) from Newfoundland is presumably a green state of *A. scabra.* Its flat leaves, more or less spreading panicle "*lucidissimae*," its hispid rays up to 3½ inches long, its awnless lemma and its short-pilose callus are all characters of *A. scabra.*

*A. SCABRA, var. **septentrionalis** var. nov. (TAB. 246, FIGS. 1 and 2), spiculis 3.2–4.3 mm. longis; glumis lanceolato-attenuatis apice subaristatis; lemmatibus 2–2.5 mm. longis.—Labrador to Nova Scotia. LABRADOR: sandy shore of island near mouth of Naskaupi River, Lake Melville, August 4, 1921, *Wetmore*, no. 103,103. NEWFOUNDLAND: dry sterile meadow at head of Mauve Bay, August 12, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,468; glades in spruce swamp, Brig Bay, Aug. 7, 1924, *Fernald, Long & Dunbar*, no. 26,252; open savannah near mouth of Main River, Bonne Bay, August 27, 1929, *Fernald & Long*, no. 1306; dry serpentine slopes near Winterhouse Brook, Bonne Bay, August 8, 1929, *Fernald, Long & Fogg*, no. 1310 (TYPE in Gray Herb.); St. George's, July 29, 1922,

Mackenzie & Griscom, no. 11,144; wet thicket on gneiss hills, Burgeo, September 15, 1926, *Fernald, Long & Fogg*, no. 81 (many spikelets modified by nematodes); knolls in wet bog-barrens, Trepassey, August 16, 1924, *Fernald, Long & Dunbar*, no. 26,252. QUEBEC: près des chutes, Natashquan, 31 juillet, 1928, *Victorin & Rolland*, no. 28,097; various stations, Anticosti, *Victorin & Rolland*, nos. 27,818–27,822. MAGDALEN ISLANDS: wet bogs among the sand ridges back of the Narrows, Alright Island, August 21, 1912, *Fernald, Long & St. John*, no. 6850; Grand-Étang sur la Dune du Nord, Ile de la Grande-Entrée, 9 août, 1919, *Victorin & Rolland*, no. 9017; sprawling in dry clearing, Brion Island, August 8, 1914, *St. John*, no. 1766. NOVA SCOTIA: swampy edge of fresh water pond and dune hollows, Sable Island, August 27 and 30, 1913, *St. John*, nos. 1165, 1166; springy sphagnous bog in spruce woods near mouth of Broad River, August 16, 1920, *Fernald & Bissell*, no. 19,913; dryish sphagnous swales and bogs by Harris's Lake, Tiddville, August 22, 1920, *Fernald & Long*, no. 19,914; swampy spruce woods and thickets by Minnigobake Lake, Belleville, July 29, 1920, *Long & Linder*, no. 19,900; wet peaty sloughs in barrens, Lower Argyle, August 11, 1920, *Fernald, Bissell, Graves, Long & Linder*, no. 19,911, in part; sphagnous swales bordering Salmon (Greenville) Lake, August 13, 1920, *Fernald, Bissell, Graves, Long & Linder*, no. 19,912; wet savannah bordering Goven Lake, July 23, 1921, *Fernald, Bartram & Long*, no. 23,267.

*Var. SEPTENTRIONALIS, forma **setigera**, f. nov., lemmatibus setigeris.—Range of the awnless form, often more abundant. NEWFOUNDLAND: swampy woods, Bell Island, Conception Bay, August, 1901, *Howe & Lang*, no. 1302; Grand Lake, 1908, *Owen Bryant;* serpentine tableland, alt. 380 m., Bonne Bay, August 27, 1910, *Fernald & Wiegand*, no. 2514; open peat bogs, Birchy Cove (Curling), August 10, 1910, *Fernald & Wiegand*, no. 2513; sphagnous marsh, Lark Harbor, August 31, 1926, *Fernald, Long & Fogg*, no. 78; dry meadows, Bay St. George, August 5–7, 1901, *Howe & Lang*, no. 1013; wet moss and peat on the gneiss hills near Sand Bank, west of Burgeo, September 9, 1926, *Fernald, Long & Fogg*, no. 79 (TYPE in Gray Herb.); crests and crevices of gneiss ledges, Burgeo, September 10 and 15, 1926, *Fernald, Long & Fogg*, nos. 80, 84, 85. QUEBEC: gneiss ledges, Mutton Bay, September 7, 1925, *Fernald & Long*, no. 27,467; sur les rochers granitiques près de l'embouchure, Rivière Romaine, 20 juillet, 1925, *Victorin, Rolland & Louis-Marie*, no. 20,635. MAGDALEN ISLANDS: sphagnous boggy margin of pond, southeast of Étang du Nord, and dry open woods and clearings, Étang du Nord, Grindstone Island, July 24, 1912, *Fernald, Bartram, Long & St. John*, nos. 6847, 6848; wet bogs and mossy pond-margins, between East Cape and East Point, Coffin Island, August 17, 1912, *Fernald, Long & St. John*, no. 6851; dunes de la Pointe de l'Est, 29 juillet, 1919, *Victorin & Rolland*, no. 9018. NOVA SCOTIA: peat bog at head of White Spring, St. Paul Island, August 6, 1929, *Perry & Roscoe*, no.

51; Canso, July 18, 1901, *Fowler;* spruce swamp, Markland (Cape Forchu), August 22, 1921, *Fernald & Long*, no. 23,272.

When not called *Agrostis scabra* or *A. hyemalis*, *A. scabra*, var. *septentrionalis* (including f. *setigera*) has been distributed either as *A. borealis* Hartm., *A. geminata* Trin., *A. elata* (Pursh) Trin., *A. hyemalis* var. *geminata* (Trin.) Hitchc. or *A. hyemalis*, var. *elata* (Pursh) Fern. From *A. borealis* it is at once separated by its long and flexuous strongly hirtellous branches which place it with *A. scabra.* From *A. geminata* it is distinguished by the very diffuse and flexuous prolonged branches, the panicle ⅓–⅔ the full height of the plant, the mature and strongly divergent or reflexed branches strongly gibbous at base, and the ligules 4–7 mm. long; *A. geminata* having the mature panicle smaller and more regularly ovoid, only $^1/_6$– very rarely $^1/_2$ the full height of the plant, its stiffer or merely arching shorter branches scarcely gibbous at base and the ligule of the usually shorter cauline leaves 1.5– rarely 4 mm. long. *A. scabra* var. *septentrionalis* has often been confused with the southern Coastal Plain *A. elata* (Pursh) Trin. and when I made the combination *A. hyemalis* var. *elata* (Pursh) Fern. Rhodora, xxiii. 229 (1922) I was influenced by the fact that the plant of Nova Scotia, the Magdalen Islands and Newfoundland is clearly an extreme of *A. scabra* (at that time confused with *A. hyemalis*). In *A. elata*, however, the cauline leaves are numerous (5–10), in *A. scabra*, var. *septentrionalis* only 2–4; the panicle is lanceolate to narrowly ovoid, not diffuse; and the lemma is conspicuously dark-nerved, nearly as long as the glumes, the lemma of *A. scabra* not evidently nerved and much shorter.

Agrostis geminata Trin., forma **exaristata**, f. nov., lemmatibus muticis exaristatis.—Throughout the range of the typical form with awned lemmas, often more abundant. Type: muddy border of small lake at about 530 m. alt., back of North Fork Camp, North Fork of Madeleine River, Gaspé Co., Quebec, August 12, 1923, *Fernald, Dodge & Smith*, no. 25,485 (in Gray Herb.).

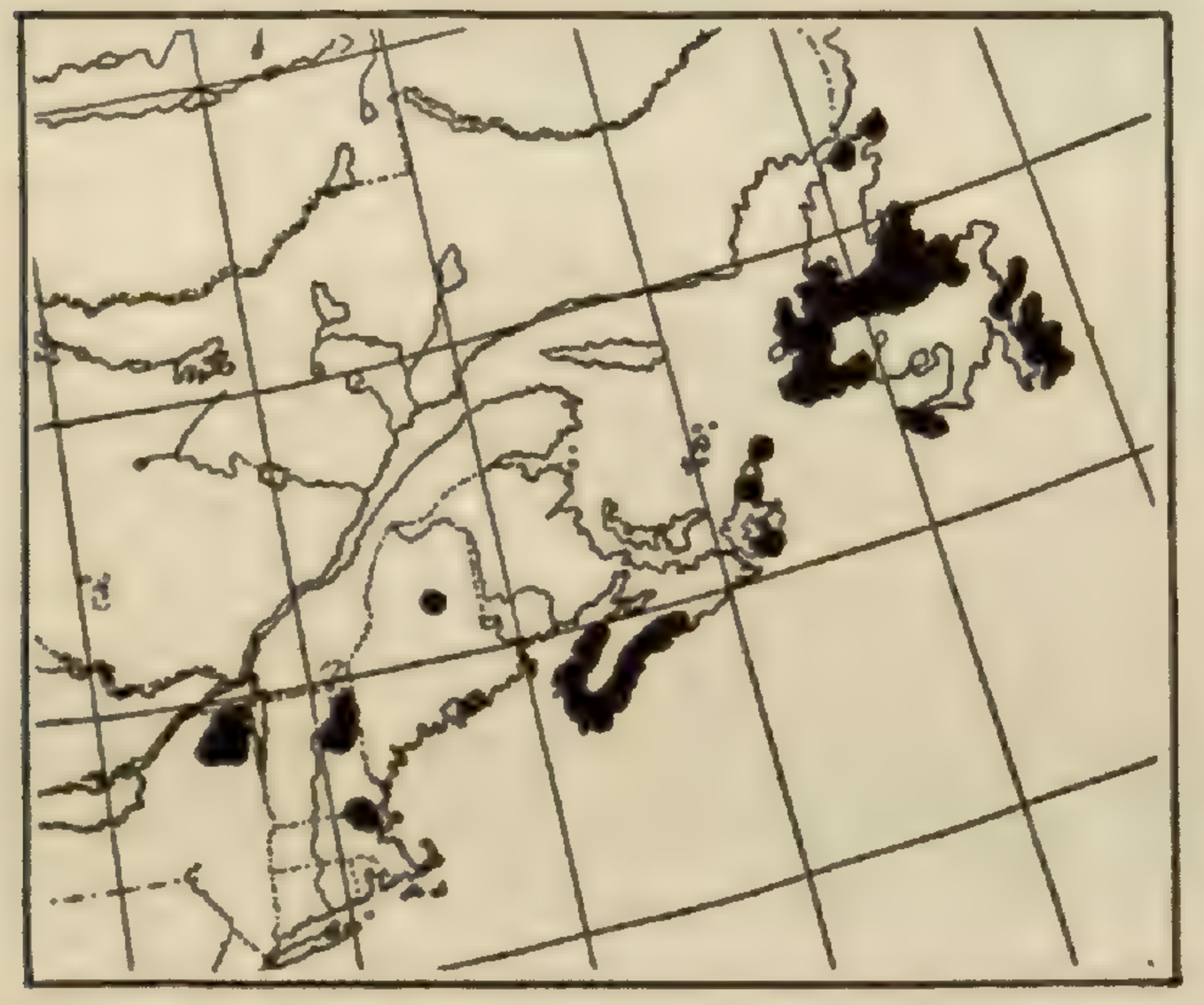
Although *Agrostis geminata* is treated by Hitchcock as a variety of *A. hyemalis* (i. e. *A. scabra*), and where the two grow together they seem to merge, the same may be said of *A. geminata* and *A. borealis* Hartm. *A. geminata* is one of the strong links in a chain of somewhat confluent species (*A. scabra, A. perennans* Tuckerm., *A. elata* (Pursh.) Trin., *A. geminata, A. borealis* and *A. canina* L.; and doubtless others.) Only confusion would result from merging them all as one species. It seems better to treat them as reasonably distinct

species which at their meeting-places are occasionally interfertile. Such conditions are familiar in many northern groups.

The Newfoundland collections of

*A. GEMINATA, f. EXARISTATA are the following. AVALON PENINSULA: dry peaty or gravelly silicious barrens, Trepassey, *Fernald, Long & Dunbar*, no. 26,263. STRAITS OF BELLE ISLE: wet boggy tundra, Quirpon Island, *Fernald & Long*, no. 27,471. HA-HA BAY: trap ledges, Piton Point, *Wiegand, Gilbert & Hotchkiss*, no. 27,469. INGORNACHOIX BAY: limestone barrens, Pointe Riche, *Fernald, Wiegand & Kittredge*, no. 2527. CAPE ST. GEORGE: dry limestone barrens, Green Gardens, *Mackenzie & Griscom*, no. 11,080.

CALAMAGROSTIS PICKERINGII Gray. and var. DEBILIS (Kearney) Fernald & Wiegand. MAP 20. Both of general range over southern, central and eastern Newfoundland and in the East extending to the eastern shores of the Straits of Belle Isle. Near the West Coast our northernmost stations are the tablelands of Bonne Bay.



Map 20. Range of CALAMAGROSTIS PICKERINGII.

As an apparently old type, of pre-Wisconsin dispersal, *Calamagrostis Pickeringii* is notable. Dominant on peaty barrens at all levels in Newfoundland and Nova Scotia, it is absent from New Brunswick and most of Maine, but reappears in the alpine areas of Mt. Katahdin, the White Mts., the northern Green Mts. and the Adirondacks, whence it occasionally descends to the valleys. It has an isolated area in northeastern Massachusetts and adjacent southeastern New Hampshire (where the long-weathered till gives evidence of very early, rather than recent, glaciation); and there is an outlying area for a related plant (perhaps specifically separable) in northern Michigan. The range of the species is, emphatically, a disrupted one. The nearest allies of *C. Pickeringii* (sharing with it the prolonged and geniculate or twisted awn) are *C. Porteri* Gray and *C. perplexa* Scribn. *C. Porteri* is one of the rarest of relic-species, with four isolated stations: one each, on rocky wooded slopes, in Chemung Co., New York; Huntingdon Co., Pennsylvania;

FIG. 1, CAREX INCURVA, var. SETINA from Newfoundland; FIG. 2, C. LANGEANA from Newfoundland; both × 1.

and Page and Giles Cos., western Virginia. *C. perplexa* is even rarer: with the original station a bluff in Tompkins Co., New York, the other (for a similar but not quite identical plant) a quartzite cliff in Piscataquis Co., Maine.

Also having a geniculate and exserted awn is the arctic *Calamagrostis purpurascens* R. Br., likewise with a remarkably disrupted range: the unglaciated margin of Greenland; arctic northwestern Canada, thence along the Cordillera to South Dakota, Colorado, Nevada and California; with the only known station in the East (south of Greenland) a single colony on one of the highest cliffs of Bic, Quebec.[1]

The senility of this group of relic-species is in striking contrast to the aggressive and hopelessly variable complex which we call *Calamagrostis canadensis* (Michx.) Nutt., dominant and continuously spread across the cool-temperate, only recently available (since the Wisconsin) regions of Canada and the Northern States.

C. INEXPANSA Gray, var. ROBUSTA (Vasey) Stebbins, RHODORA, xxxii. 48 (1930). *C. hyperborea*, in part, of Newfoundland records, not Lange. One of the commonest grasses of western Newfoundland, chiefly in calcareous or magnesian soils, both wet and dry and at all altitudes. Our northern-most station is on the STRAITS OF BELLE ISLE: Rock Marsh, Flower Cove, *Fernald, Long & Dunbar*, no. 16,272; the most southern on PORT AU PORT BAY: Table Mt., *Fernald, Wiegand & Kittredge*, no. 2558. From central Newfoundland we know it from Grand Lake, *Waghorne*, no. 43; and Bishop Falls, *Fernald, Wiegand & Darlington*, no. 4582.

Except for its occurrence in Newfoundland and the closely allied region of Quebec (Côte Nord, Mingan Islands, Anticosti and Gaspé) var. *robusta* is cordilleran.

[1] Typical *Calamagrostis purpurascens* occurs in easternmost Asia, south, locally, to the highest mountains of Japan. It is *C. purpurascens*, var. *parvigluma* (Takada) Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. Sapporo, xxvi. pt. 2: 145 (July 15, 1931), based on *C. urelytra*, β. *parvigluma* Takeda, Tokyo Bot. Mag. xxiv. 37 (1910). Miyabe & Kudo treat *C. urelytra*, α. *macrantha* Takeda with "Glumis sterilibus 8–10–12 mm longis" as typical *C. purpurascens* R. Br. and they transfer his *C. urelytra*, β. *parvigluma* with "Glumis sterilibus 6–7 mm longis" to varietal rank under *C. purpurascens*. Three plants of Richardson's original material upon which *C. purpurascens* R. Br. was based, preserved in the Gray Herbarium, and spikelets from the type sent by Hooker to Asa Gray show the glumes to be consistently 5.5–6.5 mm. long. Consequently, *C. purpurascens*, var. *parvigluma* (*C. urelytra*, var. *parvigluma*) is scarcely separable from it. The plant of northern Japan and the Kurile Islands with extraordinarily large spikelets ("Glumis sterilibus 8–10–12 mm longis") is, then, the extreme departure from typical *C. purpurascens*. It becomes

CALAMAGROSTIS PURPURASCENS R. Br., var. **macrantha** (Takeda), comb. nov. *C. urelytra* Hack., α. *macrantha* Takeda, Tokyo Bot. Mag. xxiv. 36 (1910). *C. purpurascens* Mayabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. Sapporo, xxiv. 146 (1931), not R. Br.

C. INEXPANSA, VAR. BREVIOR (Vasey) Stebbins, l. c. 50. *C. hyperborea elongata* and *hyperborea americana* Kearney. Judged by the number of collections, much less common than var. *robusta*. The Newfoundland collections identified by Stebbins are the following. VALLEY OF THE EXPLOITS: ledges, talus and gravel (calcareous), Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 4583, 4584; rocky shore, Buchan Junction, July 19, 1930, *K. P. Jansson*. HIGHLANDS OF ST. JOHN: dry white limestone bluff opposite western escarpment of Bard Harbor Hill, *Fernald & Long*, no. 27,498. ST. JOHN BAY: swale back of beach, Bard Harbor, *Wiegand, Gilbert & Hotchkiss*, no. 27,497. BONNE BAY: thicket bordering marl-pond, Storehouse Cove, *Fernald, Long & Fogg*, no. 1322; limestone cliffs and talus, Tucker's Head, no. 1323; open savannah and springy swale near mouth of Main River, *Fernald & Long*, nos. 1324, 1325. VALLEY OF THE HUMBER: dry limestone gravel, Hannah's Head, *Fernald & Long*, no. 1318. CAPE ST. GEORGE: headlands of the Cape, *Mackenzie & Griscom*, no. 11,117.

All other material distributed by me as *Calamagrostis hyperborea* belongs to *C. inexpansa*, var. *robusta*.

C. NEGLECTA (Ehrh.) Gaertn., Meyer & Scherb. See Stebbins, l. c. 53. In Newfoundland *C. neglecta* is far less common than the varieties of *C. inexpansa*. The following are identified by Stebbins as typical. SACRED BAY: bog barren ("mesh") south of Ship Cove, *Fernald, Wiegand & Long*, no. 27,492. PISTOLET BAY: gravelly and turfy strand near Isthmus Cove, *Wiegand, Gilbert & Hotchkiss*, no. 27,491. ST. JOHN BAY: turf overlying limestone, Savage's Island, *Fernald, Long & Fogg*, no. 1315. PORT AU PORT BAY: wet runs and boggy spots in limestone barrens, Table Mt., *Fernald, Wiegand & Kittredge*, no. 2548.

The first two numbers were erroneously distributed as Var. *borealis*.

C. NEGLECTA, VAR. BOREALIS (Laestad.) Kearney. Rare. PISTOLET BAY: tundra on southern half of Burnt Cape, *Fernald & Long*, no. 27,490. STRAITS OF BELLE ISLE: swales and wet peaty limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,270. VALLEY OF THE HUMBER: sandy lake-side, Grand Lake, *Waghorne*, no. 41.

MUHLENBERGIA UNIFLORA (Muhl.) Fern., VAR. TERRAE-NOVAE Fern. RHODORA, XXIX. 11 (1927). PLATE 241, FIGS. 1 and 2. Reaching its northern limit, apparently, on the tableland of Lookout Mt., Bonne Bay.

As pointed out in the original discussion of var. *terrae-novae*, it often has the spikelets with 2 or 3 florets, thus making a strong departure from typical species of *Muhlenbergia* and from the theoretical 1-flowered *Agrostideae* toward *Eragrostis* of the more primitive *Festu-*

ceae. Judged by this greater development of 2-flowered spikelets in var. *terrae-novae*, it would seem to be more primitive than the continental typical *M. uniflora*, with the spikelets mostly 1-flowered.

PHLEUM ALPINUM L. In Newfoundland known only from wet, or at least damp, situations. Its southernmost known station there is on BONNE BAY: turfy slopes below limestone crest (alt. 630 m.), Killdevil, *Fernald, Long & Fogg*, no. 1327.

In view of the preference of *Phleum alpinum* for wet slopes or meadows, it is interesting, as a corollary of the principle discussed at the close of Part II (that the Arctic flora is essentially xerophytic and that it is the xerophytic Arctic species which abound on the arid rock-barrens of the West Coast) to note that *P. alpinum* was not listed by Simmons as occurring on the Arctic Archipelago and that in Greenland its northern limit is at lat. 70° (*fide* Ostenfeld).

ORYZOPSIS ASPERIFOLIA Michx. In Newfoundland this species, of dry deciduous forest in the northeastern United States, seems to occur chiefly in the "thin thickets" bordering open barrens. In central Newfoundland it is sometimes in well developed woods, but along the West Coast it follows the limestone and serpentine barrens, as characteristic of the tablelands as of lower levels. The northernmost stations are on ST. JOHN BAY: knoll in spruce thicket (on limestone), St. John's Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,510; peaty thicket bordering limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 1331. Compare statements regarding *Habenaria orbiculata* (pp. 8, 87) and *H. Hookeri* (p. 57).

O. CANADENSIS (Poir.) Torr. (*Oryzopsis pungens* of Nfd. records; *Stipa canadensis* Poir.). Probably of general occurrence in central and southern Newfoundland. The specimens at hand are few. VALLEY OF THE EXPLOITS: granitic ledges and gravel along a brook, Quarry, *Fernald, Wiegand & Bartram*, no. 4529; moist woods, Buchan Junction, July 12, 1930, *K. P. Jansson*. BAY OF ISLANDS: diorite tableland, alt. about 550 m., Blomidon, *Fernald & Wiegand*, no. 2490, *Mackenzie & Griscom*, no. 10,063; peaty and turfy subalpine meadow, Lark Mt., *Fernald, Long & Fogg*, no. 104. DISTRICT OF BURGEO AND LA POILE: in *Cladonia*-heath on dry gneiss slopes along Grandy Brook, *Fernald, Long & Fogg*, no. 105.

SPARTINA PECTINATA Link. Extended north to BONNE BAY: gravel along Deer Brook, *Fernald, Long & Fogg*, no. 1333.

ELEOCHARIS PARVULA (R. & S.) Link (*Scirpus nanus* Spreng.). Extended north to BONNE BAY: brackish gravel-flat at mouth of McKenzie River, *Fernald, Long & Fogg*, no. 1337.

E. UNIGLUMIS (Link) Schultes, var. HALOPHILA Fern. & Brackett, RHODORA, xxxi. 72, t. 183 (1929). Extended north from Bay St.

George, to BONNE BAY: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1341.

*E. ACICULARIS (L.) R. & S., var. SUBMERSA (Hj. Nilss.) Svenson, RHODORA, xxxi. 188 (1929). The first station known south of the Labrador Peninsula is on BONNE BAY: brackish mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1344. See p. 90.

SCIRPUS CESPITOSUS, var. DELICATULUS Fern., RHODORA, xxiii. 25 (1921). To the original Newfoundland station on the Gander River may be added one on BONNE BAY: gravel along Deer Brook, *Fernald, Long & Fogg*, no. 1349.

S. AMERICANUS Pers. Extended north to BONNE BAY: tidal mud and gravel at mouth of Main River, *Fernald & Long*, no. 1354; plants all sterile.

S. ACUTUS Muhl. The northernmost known station is on BAY OF ISLANDS: marshy border of pond at foot of serpentine ridge, North Arm, *Long & Fogg*, no. 113.

ERIOPHORUM OPACUM (Bjornstr.) Fern. See RHODORA, xxvii. 208 (1925). Extended south to ST. JOHN BAY and INGORNACHOIX BAY: damp open depressions in limestone barrens, Old Port au Choix and Pointe Riche, *Fernald, Long & Fogg*, nos. 1359, 1360.

*RYNCHOSPORA CAPILLACEA Torr., var. LEVISETA E. J. Hill. BONNE BAY: bogs, July 26, 1930, *K. P. Jansson;* the first station east of the Kennebec River, Maine, although typical *R. capillacea* occurs on the Gaspé Peninsula.

CAREX INCURVA Lightf. Extended south to ST. JOHN BAY: turf overlying limestone, Grassy Island and Savage's Island, *Fernald, Long & Fogg*, nos. 1371, 1372; very luxuriant colonies, up to 2.1 dm. high. See p. 60.

*C. INCURVA Lightf., var. SETINA Christ in Scheutz, Pl. Vasc. Jeniseens. 174 (1888)—Kongl. Svensk. Vet.-Akad. Handl. xxii. No. 10: 174 (1888). Damp clay and gravel of limestone barrens, Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 1373. PLATE 247, MAP 4, p. 56.

The type of var. *setina* came from lat. 70° 10′, near the mouth of the Jenisei. I have seen none of the original material but our plant is quite like the collection from Advent Bay, Spitzbergen, August 8, 1868, *Th. M. Fries*, which is cited by Kükenthal in Engler, Pflanzenr. iv[20]. 114 (1909) as var. *setina*. Kükenthal cites other specimens from Samojeden, Nova Zembla, Tschutchesland and western Greenland; and in the Gray Herbarium there are specimens from Jugor Straits, Arctic Russia; Jan Mayen; western Greenland and Ellesmereland; all close to or to the north of the Arctic Circle. The occurrence at sea-level at lat. 50° 43′ in western Newfoundland of this characteristically Arctic extreme of the species adds another to the many records of

Arctic types from that region. Kükenthal's description, "Culmus humilis subabsconditus. Spiculae pauciores pauciflorae" covers the essential points of the variety but the following more detailed contrast with typical *C. incurva* may be of value.

C. INCURVA (typical). Culms up to 25 cm. long: leaves up to 15 cm. long: fruiting head 8–14 cm. in diameter: perigynia 3.5–5 mm. long.

Var. SETINA. Culms 1 mm.–2 cm. long: leaves 1–3.5 cm. long: fruiting head 4–7 mm. in diameter: perigynia 3–3.5 mm. long.

Kükenthal refers to *Carex incurva*, var. *setina* the Greenland plant described and illustrated by Lange as *C. duriuscula* Lange, Fl. Dan. xvi. fasc. xlviii. 10, t. mmdcccxliii (1871). Lange supposed his plant to be *C. duriuscula* C. A. Meyer. That it is quite distinct from both *C. duriuscula* C. A. Meyer and from *C. incurva*, var. *setina* will appear in the discussion of the next species.

*CAREX **Langeana**, nom. nov. *C. duriuscula* Lange, Fl. Dan. xvi. fasc. xlviii. 10, t. mmdcccxliii (1871), as to Greenland plant, not C. A. Meyer, Mém. Acad. St. Pétersb. i. 214, t. VIII (1831). PLATE 247.

A plant of western Newfoundland, forming close turf on dry peaty limestone barrens bordering Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 1374, seems to be quite identical with the plant described and beautifully illustrated by Lange as *C. duriuscula*. Lange supposed the Greenland plant to be *C. duriuscula* C. A. Meyer and in his *Conspectus Florae Groenlandicae*, 134 (1880) and pt. 2: 288 (1887) he so maintained it, in each case holding it as specifically distinct from the well-known *C. incurva* Lightf., next which species Lange placed his *C. duriuscula*. *C. duriuscula* C. A. Meyer, as indicated in his description and plate, has the bracts ovate and acuminate, the scales of the spike ovate and acute to merely obtuse, the anthers conspicuously apiculate and the perigynia 7-nerved and toward the summit serrulate. It belongs, then, close to *C. stenophylla* Wahlenb. which shares these characters and by Trautvetter, Kükenthal and others has been referred, at least as a variety, to that species. In the Greenland plant of Lange and in the plant of western Newfoundland identified with it, the bracts are broader and rounded at summit, the anthers are blunt and the nerveless perigynia are barely roughened on the margin toward the tip; it is certainly not the same as *C. duriuscula* C. A. Meyer.

Kükenthal and other European students refer *Carex duriuscula* Lange, not C. A. Meyer, without question to *C. incurva* Lightf. or to its dwarf var. *setina* Christ; and in his treatment in *Das Pflanzen-*

reich[1] Kükenthal emphasizes his reduction of it by a mark of affirmation. Nevertheless, *C. incurva*, var. *setina*, which occurs in western Newfoundland on the same barren with *C. Langeana*, has there, as in the material from Greenland, Jan Mayen, Spitzbergen and arctic Siberia, the globose or subglobose inflorescences characteristic of all *C. incurva*, and very thin and scarious or hyaline whitish or broadly white-bordered divergent scales; *C. Langeana* has ellipsoid or thick-cylindric spikes with firmer and deep-ferruginous appressed-ascending scales with only a narrow pale border. The anthers of *C. incurva* are 1.7–2.5 mm. long, of *C. Langeana* only 1 mm. long; the perigynium of *C. incurva* is plump or subinflated, that of *C. Langeana*, as shown by Lange's immature material and by the Newfoundland collection, flat. The leaves of *C. incurva* are smooth or only slightly scabrous toward the tip; those of *C. Langeana* definitely spinulose-scabrous. It is not, therefore, satisfactory to refer *C. duriuscula* Lange (*C. Langeana*) to *C. incurva*. Lange himself, who certainly knew *C. incurva*, held them to be distinct, and the characters of the two justify his decision.

It is possible that *C. Langeana* had its origin by the crossing of *C. gynocrates* Wormsk. with *C. incurva* or *C. incurva*, var. *setina*. In the region of Newfoundland where it occurs *C. gynocrates* and *C. incurva* are common and the station for *C. Langeana* is very near our station for *C. incurva* var. *setina*. The latter as well as the larger extremes of *C. incurva* and *C. gynocrates* often fruit abundantly; while the achenes of *C. Langeana* are not well developed. Superficially *C. Langeana* strongly suggests the Arctic-European *C. Deinbolleana* Gay, which is generally accepted as a hybrid of *C. dioica* L. and *C. incurva*. The Newfoundland and Greenland representative of *C. dioica* is *C. gynocrates* and, crossed with *C. incurva*, it would undoubtedly produce a plant strongly simulating *C. Deinbolleana*. On the other hand, sterility is only negative evidence of hybrid origin. *C. gynocrates* and other unique species are often quite sterile and Simmons specially comments[2] on the frequent sterility of *C. incurva*. Lange, in his *Conspectus Florae Groenlandicae*, 134 and pt. 2: 288, cites *C. Langeana* (as *C. duriuscula*) from three definite stations; he cites *C. gynocrates* from five stations and *C. incurva* from nine, but in no case is any station for *C. Langeana* identical with any for either *C. gynocrates* or *C. incurva*. Whether the later collections of *C. Langeana*

[1] Kükenthal in Engler, Pflanzenr. IV[20]. 114 (1909).

[2] Simmons, Phytogeogr. Arct. Am. Archipel. 60 (1913).

from Greenland have good fruit I do not know, but Lange certainly gave no intimation that the plant he took to be *C. duriuscula* was not a definite species. Until the question can be further checked in the field both in Greenland and in Newfoundland, the possible hybrid origin of *C. Langeana* must remain an open question.

C. Wiegandii Mackenz. N. Am. Fl. xviii. 108 (1931). Extended north to Bonne Bay: boggy spruce thickets near Winterhouse Brook, *Fernald, Long & Fogg,* no. 1381.

C. cephalantha (Bailey) Bickn. Range extended north to Bonne Bay: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1384.

This material, like some other collections from western Newfoundland, has the perigynia as slender as in *C. angustior* Mackenz. The plant deserves special watching in the field.

C. Deweyana Schwein. To the very few Newfoundland stations add the following, St. John Bay: bushy swale back of Eddy's (Old Man's) Cove, *Fernald, Long & Fogg,* no. 1385. Bonne Bay: turfy slopes below limestone crest (alt. 650 m.), Killdevil, no. 1386.

C. scoparia Schkuhr. Range extended north to Bonne Bay: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1388.

C. hormathodes Fern. Frequent on the South Coast, its northern outposts are on Bonne Bay and Notre Dame Bay. Bonne Bay: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1390; brackish swale near mouth of McKenzie River, no. 1391. Notre Dame Bay: brackish shore of Dildo Run, *Fernald, Wiegand & Bartram,* no. 4810.

* × C. **trichina,** nom. nov. *C. tenuiflora* × *trisperma* Fern. Rhodora, iv. 226 (1902). Valley of the Exploits: muddy shore, Buchan Junction, July 15, 1930, *K. P. Jansson.*

This hybrid is so wide-spread in occurrence and in the two stations personally known to me, so very abundant (at the type-station so abundant as easily to furnish 100 very full sheets) that it seems more convenient to have a binomial with which to refer to it. The original collection was from an extensive colony at Fort Fairfield, Maine. It is also rather abundant on a boggy shore at Blanc Sablon, Quebec Labrador, *Fernald & Wiegand,* no. 2797; and it was collected at Lansing, Michigan, July 28, 1890, by *G. H. Hicks.*

C. novae-angliae Schwein. Occasional in the southern districts, the northern known limit on Bay of Islands: brookside-thicket, French (or Tweed) Island, *Fernald, Long & Fogg,* no. 132.

C. deflexa Hornem. Frequent or common in the southern and central districts, the northern known limit in Newfoundland, whence

it "jumps" to Greenland, is on the HIGHLANDS OF ST. JOHN: mossy shelves of quartzite cliff at head of Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 1407.

C. CONCINNA R. Br. To the two remote Newfoundland stations previously recorded add POINTE RICHE: turfy talus of limestone sea-cliffs, *Fernald, Long & Fogg*, no. 1410.

*C. GRACILLIMA Schwein., var. HUMILIS Bailey. BONNE BAY: margins of wet thickets along Winterhouse Brook, *Fernald, Long & Fogg*, no. 1426; thickets, gravelly shores and alluvial islands near mouth of Main River, *Fernald, Long & Fogg*, no. 1427.

*C. LIMOSA × RARIFLORA Norman. POINTE RICHE: wet rocky run on shelf of limestone, *Fernald, Long & Fogg*, no. 1435.

Recorded by Kükenthal from a single station each, in Norway and Sweden.

*C. BUXBAUMII Wahlenb., forma DILUTIOR Kükenth. BONNE BAY: swales and margins of wet thickets along Winterhouse Brook, *Fernald, Long & Fogg*, no. 1438.

In its whitish-brown scales very strikingly contrasted with the usual dark-scaled *C. Buxbaumii*.

CAREX ALPINA IN NORTH AMERICA.—In boreal America one of the *Carices* of the *Atratae* long and correctly passed as *C. alpina* Swartz. Recently, however, it has been the fashion to call the species *C. Halleri* Gunnerus, because the name of Gunnerus clearly antedates that of Swartz. If the change rested solely on priority of publication there would be no objection to it; but, unfortunately, Gunnerus did not understand what he was publishing and his name, *C. Halleri*, is a *nomen confusum*.

Carex alpina (*C. Halleri* of many recent authors) has the culms harsh at summit ("superne scaber"—*Kükenthal*), the leaves with scabrous-serrulate margins and midrib, the scales of the spikes purple or purplish black, without pale midnerve but with a pale hyaline margin ("Squamae ♀ parvulae . . . nigricantes clarius carinatae marginibus anguste albo-hyalinae"—*Kükenthal*). Its granular-roughened perigynia have an exceedingly short beak ("in rostrum breve . . . contracti"—*Kükenthal*). With these points in mind it is well to see just what formed the basis of *C. Halleri*. Gunnerus obviously had no material himself; his species was based on references from literature:

DCCCXLIX. CAREX (*Halleri*) spica androgyna: terminali tripartita. *Hall.* 1356. *Oed. fl. dan.* VII. 8. *t.* 403. *Scheuchz. hist. t.* 11. *f.* 8. citante Oedero.

Habitat in alpibus. Oeder.[1]

Gunn. Fl. Norv. ii. 106 (1772).

CAREX ALPINA: FIG. 1, inflorescence, × 3, from Switzerland; FIG. 6, perigynium, × 6; FIG. 2, inflorescence, × 3, from Newfoundland; FIG. 7, perigynium, × 6.

C. ALPINA, var. INFERALPINA: FIG. 3, inflorescence, × 3, from Austria; FIG. 8, perigynium, × 6; FIG. 4, inflorescence, × 3, from Quebec; FIG. 9, perigynium, × 6.

C. ALPINA, var. STEVENII: FIG. 5, inflorescence, × 3, from Colorado; FIG. 10, perigynium, × 6.

C. VESICARIA, var. LAURENTIANA: FIG. 11, inflorescence, × 1, from Saguenay Co., Quebec; FIG. 12, inflorescence, × 1, from TYPE, Doctor Hill, Newfoundland.

The plate in Flora Danica, although crude, is recognizable as *Carex alpina;* and recent Scandinavian authors and those who have followed them have taken *C. Halleri* in that sense. It should be noted, however, that the name used by Gunnerus clearly indicates that the plant of Haller is primarily intended. Consequently, in interpreting *C. Halleri* chief weight should be given to Haller's very full description. The diagnostic phrases used by Gunnerus were taken directly from Haller's description of his no. 1356. Haller's account of the plant of Switzerland which must be taken as the type of *C. Halleri* Gunn. is so important that it should be quoted:

1356. CAREX spica terminali tripartita.†
Esset *Carex* MICHELI p. 61. f. 5. t. 33. f. 6. nisi collum bifidum diceretur.
An *Cyperoides alpinum tenuifolium, spica brevi; ferruginea* SCHEUCHZER. p. 493. t. 11. f. 8.?
In alpibus reperi, ut in mont. *Fouly*, valle *Trient;* misit etiam Cl. BELLARDUS.
Folia radicalia culmo breviora, latiuscula, ad lineam & ultra. Culmus superne nudus, triquetrus, semipedalis; non asper, ut neque folia. Spica ex tribus composita congestis. Duae laterales breviores, media longior, androgynae omnes. Glumae ovatae; mucronatae, spadiceae, linea flava divisae. Capsulae breves, ventricosae, mucrone longiusculo, simplici.
Planta SCHEUCHZERI in H. S. manifesto eadem cum 1355. Nostra magis diversa, etiam spicarum numero.[1]

It will at once be noted that Haller did not accept Scheuchzer's *Cyperoides alpinum tenuifolium* as identical with his plant; therefore that can be ruled out. Haller's Swiss plant was, however, a species with culms and leaves *not scabrous* (non asper, ut neque folia), the scales of the spike with pale midrib (linea flava divisae) and the perigynia long-beaked (mucrone longiusculo). It obviously had nothing to do with *C. alpina* Swartz.

Although Haller specially pointed out that his no. 1356 was not the plant illustrated in Scheuchzer's t. 11, fig. 8, Oeder erroneously identified it with his Scandinavian specimen and Gunnerus followed Oeder. Scheuchzer's drawing was very crude, but his description extremely detailed: a loosely stoloniferous plant, the scales with a slender and pale midrib; obviously not *C. alpina* Swartz. Without attempting to identify either the plant of Haller or of Scheuchzer, problems which can best be dealt with in Europe, it is sufficient for the present study to reinstate for the circumpolar plant which has erroneously passed as *C. Halleri* the proper name, *C. alpina* Swartz.

[1] Haller, Hist. Stirp. Indig. Helv. ii. 184 (1768).

In North America *Carex alpina* is represented by three strongly marked geographic varieties. See PLATE 248, FIGS. 1–10 and MAP 21. Since the map was made Dr. Malte has kindly sent me the material in the Canadian National Herbarium. Dr. Malte's personal collections show *C. alpina*, var. *typica* from several additional stations on Hudson Strait and the northern coast of Hudson Bay.

Map 21. American Range of CAREX ALPINA: var. TYPICA, solid dots; var. INFERALPINA, circles; var. STEVENII, crosses.

C. ALPINA, var. **typica.** *C.alpina* Swartz in Liljeblad, Svensk. Fl. ed. 2: 26 (1798). *C. Vahlii* Schkuhr, Riedgr. i. 87, t. Gg, fig. 94 (1801).—Cespitose; the stiff culms 0.5–3 dm. high: perigynia trigonous-obovoid, abruptly short-beaked, 2–2.5 mm. long, becoming reddish or purplish in maturity, strongly granular-papillose, the tips not recurving.—Greenland and Baffin Island south to Straits of Belle Isle, Newfoundland; alpine regions of the Shickshock Mts., Quebec; and Hudson Bay, Manitoba. The following, not including many Greenland specimens, belong here. BAFFIN ISLAND: Frobisher Bay, *C. S. Sewall*, no. 238 (in part). LABRADOR: on granitic rock, Ryan's Bay, *Woodworth*, nos. 102, 103; Okak, *Samuel Weitz;* Anatolak, *Sewall*, nos. 401, 403, 409; fresh marsh, upland terrace, Indian Harbor, *Bishop*, no. 151. NEWFOUNDLAND: turfy slopes of slaty hills, Little Quirpon, *Fernald & Long*, no. 27,697; turfy hillsides and barrens, western side of Quirpon Island, *Wiegand, Gilbert & Hotchkiss*, no. 27,698; dry sterile meadow, head of Mauve Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,701; turfy shore, Cape Onion, *Fernald*, no. 27,700; dry crests of trap cliffs, Anse aux Sauvages,

Fernald, Wiegand & Long, no. 27,699. QUEBEC: cold chimneys in the schists at about 900–1000 m. alt., south of Fernald Pass, Mt. Mattaouisse, Matane Co., *Fernald & Smith*, no. 25,550. KEEWATIN: Fullerton, *J. M. Macoun*, no. 79,025. MANITOBA: Churchill, *J. M. Macoun*, no. 79,049. FIGS. 1, 2, 6 and 7.

Some of the American material has the perigynia tighter than in much of the European and on account of this character I designated in the herbarium at Kew a collection from Okak (*Weitz*) as an undescribed species. The character breaks down in a large series and I am unable to separate the material from bleak or alpine habitats in northeastern America from European *C. alpina*. The plant of low altitudes across southern Canada, extending northwest to Mackenzie, Yukon and Alaska and south to Lake Superior, is var. *inferalpina* Wahlenb. Although recent European authors have largely ignored var. *inferalpina* and Kükenthal treats it only as a minor form, it is in North America a plant of moist wooded or bushy habitats in the Canadian forest region, with a range and with local habitats quite distinct from those of the arctic-alpine *C. alpina*. If treated as a species var. *inferalpina* would be *C. angarae* Steud. Syn. Cyp. 190 (1855), fide annotation by Kreczetowicz. This synonym should be noted as unintentionally omitted from the following paragraph.

Var. INFERALPINA Wahlenb. Fl. Lapp. 241 (1812). Forma *inferalpina* (Wahlenb.) Kükenth. in Engler, Pflanzenr. iv^{20}. 386 (1909).—Usually slender and soft, less cespitose, 1.5–5 dm. high; perigynia ellipsoid or ellipsoid-obovoid, more prolonged, 2.5–3.5 mm. long and tapering to the beak, in age with widely spreading to recurving tips, whitish, stramineous or pale-brown, less conspicuously granulose.—Southeastern Labrador Peninsula to Yukon and Alaska, south, chiefly in calcareous regions, in mossy woods and thickets or on shores, to northern New Brunswick, the Lake Superior region of Michigan and Minnesota, southern Manitoba, southern Alberta, Idaho and southern British Columbia. FIGS. 3, 4, 8 and 9.

Var. STEVENII Holm, Am. Journ. Sci. ser. 4, xvi. 21, 27 (1903).—Intermediate in appearance between the other two varieties; spikes more slender and elongate; perigynia as in var. *inferalpina* but less prolonged and not recurving at tip.—Mountains of Colorado and Utah. FIGS. 5 and 10.

(*To be continued*)

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 223*)

C. stylosa C. A. Meyer. Additional stations from Highlands of St. John: peat on quartzite slopes, head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1441. Bonne Bay: peaty or turfy upper quartzite slopes (alt. 600–650 m.), Killdevil, no. 1442.

*C. salina Wahlenb., var. pseudofilipendula Kükenth. Bonne Bay: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1449.

In Rhodora, xxviii. 166 (1926), I recorded this variety from Newfoundland on the strength of a collection which closely matches Scandinavian material of Kükenthal's hybrid of it with *C. aquatilis*. The Main River material seems to be the pure variety.

C. crinita Lam. Typical *C. crinita* is not common in Newfoundland. The northernmost station on the West Coast is on Bay of Islands: mossy spruce woods and thickets, Lark Harbor, *Fernald, Long & Fogg*, no. 144.

C. lasiocarpa Ehrh. The northernmost known Newfoundland station is on St. John Bay: wet bog back of Eddy's (or Old Man's) Cove, *Fernald, Long & Fogg*, no. 1452.

C. Hostiana DC., var. laurentiana Fern. & Wieg., Rhodora, xxvi. 122 (1924). The most extensive development of the variety yet known is on Bonne Bay: dominant on gravelly shore and alluvial islands near mouth of Main River, *Fernald, Long & Fogg*, no. 1454. Accompanied by an abundant hybrid:

*× C. **xanthina**, hybr. nov. (*C. flava* × *Hostiana* var. *laurentiana*). × *C. xanthocarpae* Degl. (*C. flava* × *Hostiana*) similis, omnibus partibus majoribus; culmis 7–8 dm. altis supra scabris; foliis 3–4 mm. latis; spicis femineis 1.2–2 cm. longis 7–10 mm. crasiis, imis 3–11 cm. distantibus; periginiis ovatis inflatis 4–5 mm. longis longe rostratis, valde costatis.—Newfoundland: several large clumps with the abundant parents on gravelly shores and alluvial islands near mouth of Main River, Bonne Bay, August 27, 1929, *Fernald, Long & Fogg*, no. 1455 (type in Gray Herb.).

× *C. xanthina* clearly combines the characters of its parents and is quite sterile. It strongly simulates × *C. xanthocarpa* (× *C. fulva*

JUNCUS TRIGLUMIS: FIG. 1, habit, × 1, from the Tyrol; FIG. 2, fruiting glomerule, × 3, from western Siberia; FIG. 3, seeds, × 12, from Switzerland.

J. ALBESCENS: FIG. 4, habit, × 1, from Newfoundland; FIG. 5, fruiting glomerule, × 3; FIG. 6, seeds, × 12.

Hoppe, not Good.) of Europe, a frequent hybrid there between *C. flava* and typical *C. Hostiana*. Another hybrid of *C. Hostiana*, var. *laurentiana*, abundant at the type-locality is

* × C. **pseudo-fulva**, hybr. nov. (*C. Hostiana*, var. *laurentiana* × *lepidocarpa*). × *C. xanthinae* similis; culmis apice leviusculis; spicis femineis imis 1–6 cm. distantibus.—NEWFOUNDLAND: abundant with the parents, wet runs and boggy spots in limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port au Port Bay, August 16, 1910, *Fernald, Wiegand & Kittredge*, no. 4258 (TYPE in Gray Herb.)

Very similar to × *C. Leutzii* Kneucker (*C. Hostiana* × *lepidocarpa*), a frequent European hybrid, but larger in all parts.

* × C. PIEPERIANA P. Junge (*C. flava* × *lepidocarpa*). With the parents at peaty margin of spring-rill in spruce swamp, Brig Bay, *Fernald, Long & Dunbar*, no. 26,434.

* × C. **subviridula** (Kükenth.), comb. nov. *C. flava* × *Oederi*, forma *subviridula* Kükenth. in Engler, Pflanzenr. IV[20]. 678 (1909). *C. flava* × *Oederi*, var. *pumila* (*Oederi*, var. *viridula*). One of the commoner hybrids of Newfoundland. VALLEY OF THE EXPLOITS: ledges and talus, Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, no. 4987; sandy shore, Buchan Junction, July 9, 1930, *K. P. Jansson*. ST. JOHN BAY: pools back of beach, Bard Harbor, *Wiegand, Gilbert & Hotchkiss*, no. 27,744. BONNE BAY: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1464.

C. CRYPTOLEPIS Mackenz. Common in southern and central Newfoundland, its northern limits seem to be on BAY OF ISLANDS: peaty and gravelly thickets, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 149; and on NOTRE DAME BAY: gravelly pond-shores, Lewisport, *Fernald, Wiegand & Darlington*, no. 4982.

C. OEDERI Retz., var. PUMILA (Coss. & Germ.) Fern., RHODORA, viii. 201 (1906). *C. viridula* Michx. Fl. Bor.-Am. ii. 170 (1803). *C. flava*, var. *pumila* Coss. & Germ. Fl. Par. 602 (1845). *C. flava*, var. *viridula* (Michx.) Bailey, Mem. Torr. Bot. Cl. i. 31 (1889). *C. Oederi*, var. *viridula* (Michx.) Kükenth. in Engler, Pflanzenr. iv. 20 (1909).

Kükenthal does not cite, even in synonymy, either *C. flava* var. *pumila* Coss. & Germ or *C. Oederi*, var. *pumila;* and he treats *C. Oederi*, var. *viridula* as strictly North American and eastern Asiatic. Nevertheless, I still find myself as unable as I was in 1906 to see wherein the small states of *C. viridula* Michx. differ from authentic material of Cosson & Germain's *C. flava*, var. *pumila*. The account by Cosson & Germain was clear:

var. γ. *pumila*. (C. OEderi. Ehrh. calam. n. 79.—Host, Gram. I. t. 65.)—Tiges de 5–15 centimètr. Epis femelles, sessiles, rapprochés-

agglomérés. Utricules très petits, terminés par un bec court droit.—*A. C.* Marais desséchés, bords des mares et des étangs, surtout des terrains sablonneux.—Bords de la Seine! St-Léger! Senart! Fontainebleau!, etc.

Although Cosson & Germain cited as a synonym *C. Oederi* of Ehrhart and of Host, their variety rests primarily upon the plant described from the "Environs de Paris." An authentic specimen in the Gray Herbarium collected by Cosson near Paris, "In paludosis pr. St. Hubert (Seine et Oise)," seems to me quite inseparable from the American *C. viridula* Michx.

C. MICROGLOCHIN Wahlenb. A slight extension southward to INGORNACHOIX BAY: peaty and marly borders of shallow ponds in limestone barrens, Old Port au Choix and Pointe Riche, *Fernald, Long & Fogg*, nos. 1465, 1466.

C. VESICARIA L., var. JEJUNA Fern. A considerable northern extension to HIGHLANDS OF ST. JOHN: dry meadow on tableland of Doctor Hill, *Fernald, Long & Fogg*, no. 1473.

*CAREX VESICARIA L., var. **laurentiana**, n. var. (TAB. 248, FIGS. 11 and 12), var. *monilem* simulans; spicis foemineis cylindricis 1–3.5 cm. longis 7–12 mm. crassis; squamis ovato-lanceolatis attenuatis plus minusve purpureo-castaneis 5–7 mm. longis perigyniis subaequantibus; spicis masculis 1 vel 2.—Western Newfoundland, Saguenay County and Magdalen Islands, Quebec and southern New Brunswick. NEWFOUNDLAND: dry meadow on tableland of Doctor Hill, Highlands of St. John, July 31, 1929, *Fernald, Long & Fogg*, no. 1474 (TYPE in Gray Herb.). QUEBEC: swale, St. Paul, Chevalier, Saguenay Co., July 26, 1915, *St. John*, no. 90,279; grassy shore, Romaine, Lagorgendière, Saguenay Co., August 31, 1915, *St. John*, no. 90,225; platières de sable, Rivière Mingan, Saguenay Co., 26 juillet, 1926, *Victorin & Rolland*, no. 24,511. MAGDALEN ISLANDS: lieux humides, Ile du Bassin, 15 juillet, 1919, *Victorin & Rolland*, no. 9230. NEW BRUNSWICK: Grand Manan Island, 1861, *J. T. Rothrock*.

In the type-collection of *C. vesicaria*, var. *laurentiana* the culms are only 2–3.5 dm. high, but in specimens from lower altitudes they may reach a height of 8 dm. In its very long and broad usually dark-purple scales var. *laurentiana* is conspicuously different from typical *C. vesicaria* and its described varieties, in which the scales, although sometimes dark, are conspicuously shorter than the perigynia. The variety is apparently local, or perhaps of more northern range than we yet know. Its occurrence on the high tableland of Doctor Hill in Newfoundland and its range westward on the southern margin of the Labrador Peninsula, as well as its stations on the Magdalen Islands and upon bleak Grand Manan (in the mouth of the Bay of Fundy)

suggest that at these stations it is possibly reaching southern limits from a broader northern range.

The occurrence on Grand Manan or on the headlands about the Bay of Fundy or on the outer coast of Maine of plants characteristic of the bleaker regions of the Gulf of St. Lawrence but elsewhere rare or wanting in the Maritime Provinces is well known: *Draba stylaris* J. Gay, *Saxifraga Aizoon* Jacq., *Potentilla pectinata* Raf., *Loiseleuria procumbens* (L.) Desv., *Primula laurentiana* Fernald, *Senecio Pseudo-Arnica* Less. and at least 20 other species. It is, therefore, of special interest that *Carex vesicaria*, var. *laurentiana* should have been found on Grand Manan.

JUNCUS GERARDI Loisel. Extended north to BONNE BAY: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1480.

J. DUDLEYI Wiegand. In Newfoundland known only near the West Coast. BONNE BAY: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1482. BAY OF ISLANDS: marsh near mouth of Hugh's Brook, *Fernald & Wiegand*, no. 2988; wet clay slopes above the beach, Governor Island, *Fernald, Long & Fogg*, no. 164.

J. EFFUSUS L., var. COMPACTUS Lej. & Court. Extended north to BONNE BAY: open upland marsh, Bonne Bay, *Harlow Bishop*, no. 184; serpentine mud and gravel by Winterhouse Brook, *Fernald, Long & Fogg*, no. 1483.

J. EFFUSUS, var. CONGLOMERATUS (L.) Engelm. *J. conglomeratus* L. See Fernald & Wiegand, RHODORA, xii. 85 (1910). Heretofore known in Newfoundland only from the eastern and southeastern districts, but now found on BAY OF ISLANDS: dominant on sphagnous marsh, Lark Harbor, *Fernald, Long & Fogg*, no. 167.

JUNCUS CANADENSIS J. Gay, var. SPARSIFLORUS Fernald, RHODORA, xxiii. 241 (1921). All the Newfoundland material of *Juncus canadensis* belongs to var. *sparsiflorus*, the Nova Scotian variety with large flowers. In Newfoundland, the mature perianth ranges from 3.8–4.6 mm. long, rather longer than in Nova Scotia. The variety is common in wet peat in southern Newfoundland. Its most northern stations, as shown by our collections, are in the valley of the Exploits and about Bonne Bay.

J. NODOSUS L. Extended north to BONNE BAY: wet limy peat bordering pond, Storehouse Cove, *Fernald, Long & Fogg*, no. 1489; gravel along Deer Brook, no. 1490.

J. ALPINUS Vill. and var. RARIFLORUS Hartm.

As noted on p. 84, I find myself unable to follow the extreme segregations of *Juncus alpinus* recently proposed in Europe. My friend, Mr. H. W. Pugsley, describes as a new species *J. Marshallii* Pugsley,

Journ. Bot. 282, with fig. (1931), from Ross-shire in Scotland and from Flower Cove, Newfoundland (*Fernald*, no. 27,780). To me 27,780 is merely an undeveloped state of the common Newfoundland plant, *J. alpinus*, var. *rariflorus* Hartm. (var. *insignis* Fries). In this, the original identification, Dr. Lindquist coincides, saying in his important study, *Taxonomical remarks on Juncus alpinus Villars and some related species*,[1] where he reduces the Ross-shire plant to varietal rank, *J. alpinus*, var. *Marshallii* (Pugsley) Lindquist, "It may be remarked that I cannot accept the specimen no. 27780 collected in Newfoundland by FERNALD and referred to by PUGSLEY as belonging to this type."[2]

The Newfoundland material of *Juncus alpinus* falls into two well-defined, though confluent, extremes: true *J. alpinus* with the flowers all sessile or nearly sessile in dense heads, and var. *rariflorus* (= var. *insignis*) with some of them elevated above the others on elongate pedicels. The latter has often been treated as a species, *J. nodulosus* Wahlenb., but so many transitions occur that I have been unable to view the two as specifically separable. It is, therefore, gratifying to find Lindquist, likewise, treating it as a variety. Both *J. alpinus* (typical) and *J. alpinus*, var. *rariflorus* vary greatly in size and number of heads, and very dwarf colonies or selected individuals (with only 1 or 2 heads) may be artificially separated off. They are, however, at best minor forms. Var. *rariflorus* may be either dark- or light-colored. The important bibliography is given by Lindquist, though he seems to err in citing var. *rariflorus* as of "(E. Fries) C. J. Hartman." The name *rariflorus* started as *J. rariflorus* Hartm. (1820), becoming *J. nodulosus* β. *rariflorus* (Hartm.) Fries in 1828 and *J. alpinus* β. *rariflorus* Hartman—or (Hartm.) Hartm. if wished—in 1849.

Dr. T. A. Sprague, Journ. Bot. lxvi. 210 (1928), urges the taking up of *Juncus alpino-articulatus* Chaix, a name published in the general introductory matter in the 1st volume (1786) of Villars' *Histoire des Plantes de Dauphiné*, but rejected by Villars himself in the main body of his flora, Hist. ii. 233 (1787), where *J. alpinus* was published. Lindquist, however, believes, since *J. alpino-articulatus* rested only on a pre-Linnean diagnosis by Haller, which might just as well have been based on a quite different species from *J. alpinus* Vill., that it is wholly unwise to discard the definite *J. alpinus* for the wholly indefin-

[1] Lindquist, Botaniska Notiser (1932), 313–372 (1932).
[2] Lindquist, l. c. 342 (1932).

CYPRIPEDIUM PARVIFLORUM, var. PLANIPETALUM, × 1: FIG. 1, large plant from Old Port au Choix; FIG. 2, small plant from TYPE collection, Savage Cove, Newfoundland.

ite *J. alpino-articulatus*. Stability of nomenclature and avoidance of error are best maintained by holding to *J. alpinus*.

The other argument against taking up the name *J. alpino-articulatus* is the very practical one, certainly intended by the provision of the International Rules, that a name should be excluded when it is "a permanent source of confusion or error." Sprague argues that the ill-begotten *J. alpino-articulatus* would not be such a source of trouble:

It has been suggested to the writer that the name *Juncus alpino-articulatus* Chaix should be rejected under Art. 51, 4°, on the ground that it might be mistaken for a hybrid between *Juncus alpinus* and *J. articulatus* by those who were unfamiliar with the details of its publication. This suggestion appears to be unfounded: as soon as *J. alpinus* is treated as a synonym of *J. alpino-articulatus* in the principal Floras, such confusion—if it ever arose—would disappear. Hence the name *Juncus alpino-articulatus* cannot be a *permanent* cause of confusion or error, and should be adopted under International Rules.

Surely, if it be urged that *Juncus alpino-articulatus* should be maintained, in spite of *J. articulatus* L. (1753), then, similarly, *Asplenium Trichomanes-ramosum* L. (1753) must be maintained (see foot-note on p. 47) over the perfectly clear and universally used *A. viride* Hudson (1762). Botanical nomenclature at best is difficult: let us keep it clear where we can. Clarity demands the use of *Juncus alpinus* and of *Asplenium viride*.

* × J. **alpiniformis**, hybr. nov. *J. alpinus* × *articulatus* (*J. lampocarpus* Ehrh.). *J. alpino* similis; petalis attenuatis; seminibus abortivis.—NEWFOUNDLAND: abundant, with typical and fertile *J. alpinus* Vill. and *J. articulatus* L. in wet limy peat, bordering pond, Storehouse Cove, Bonne Bay, August 9, 1929, *Fernald, Long & Fogg*, no. 1501 (TYPE in Gray Herb.).

Strongly resembling typical *J. alpinus*, but with the narrow and attenuate petals of *J. articulatus*. Abundant but all sterile. As stated, in discussions under abundant hybrids of *Carex*, it is far more convenient to have a properly published binomial for hybrids of some abundance than to have to designate, at each reference to them, the long hybrid formula. In the present instance, the existence of the confusing name *J. alpino-articulatus* Chaix (discussed above) makes it doubly desirable that the hybrid *J. alpinus* × *articulatus* should have a distinctive name; otherwise we should have confusion worse confounded!

* × J. **nodosiformis**, nom. nov. *J. alpinus* × *nodosus* Buchenau in Engler, Pflanzenr. iv [36]. 216 (1906). BONNE BAY: very abundant and sterile, with the two fertile parents, wet limy peat bordering Store-

house Cove, *Fernald, Long & Fogg*, no. 1491. BAY OF ISLANDS: wet place, Birchy Cove (Curling), *Waghorne*, no. 56.

Quite like the type of Buchenau's hybrid, from Gaspé Co., Quebec; strongly simulating typical *J. alpinus* but more slender and with the very slender and freely creeping rhizome of *J. nodosus;* the sterile heads smaller and more numerous than in *J. nodosus* of the region. × *J. nodosiformis* is superficially very similar to the European *J. anceps* Laharpe, but it can hardly be referred to that species.

*J. ARTICULATUS L., var. OBTUSATUS Engelm. BONNE BAY: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, nos. 1499, 1500.

* × J. **fulvescens**, nom. nov. *J. articulatus* × *brevicaudatus* Fern. & Wieg., RHODORA, xii. 137 (1910). In southern Newfoundland, Nova Scotia and southeastern Maine very abundant, often forming extensive areas of thousands of sterile plants combining the characters of the two fertile parents. In some of these areas the infertile hybrid is far more abundant than the fertile parents, indicating that a classification which places *J. articulatus* and *J. brevicaudatus* in different sections (20 sections apart in Buchenau's treatment) is at least artificial. The following are the collections at hand of × *J. fulvescens*. NEWFOUNDLAND: springy swales among spruce thickets, Bay Bulls, *Fernald, Long & Dunbar*, no. 26,491; Murray's Pond, near St. John's, 1928, *A. M. Ayre;* springy ditch, Grand Falls, *Fernald, Wiegand & Darlington*, no. 5127; wet thickets along river, Grand Falls, no. 5128; boggy pond-margins back of Birchy Cove (Curling), *Fernald, Wiegand & Kittredge*, no. 3012; springy spots, Birchy Cove (Curling), no. 3014; ditch in gravelly thickets along Harry's River, *Fernald & Wiegand*, no. 3013. PRINCE EDWARD ISLAND: shallow pools and small ponds, Tignish, *Fernald, Long & St. John*, no. 7182. NOVA SCOTIA: Louisburg, *J. Macoun*, no. 20,720; brackish gravelly shore of Lahave River, Bridgewater, *Fernald & Long*, no. 23,619; wet savannahs along Little River, east of Tiddville, *Fernald & Long*, no. 20,690; wet peaty swale, Yarmouth, *Fernald & Graves*, no. 20,688; boggy swale, Yarmouth, *Fernald, Long & Linder*, no. 20,692. MAINE: wet mossy spot on Charlotte Road, Pembroke, *Fernald* (*& Wiegand*), no. 1588 (TYPE in Gray Herb.).

J. ALBESCENS (Lange) Fern. RHODORA, XXVI. 202 (1925). Apparently general on the West Coast, wherever the limestone barrens or limy talus prevail.

Since *Juncus albescens* has only recently been segregated from the Eurasian *J. triglumis* L. and since it has not been wholly accepted by European botanists[1] who have not been familiar with it, it is desirable to illustrate the two species side-by-side (PLATE 249).

[1] For instance, my friend, the late Dr. Ostenfeld, who enumerates for Greenland only *J. triglumis.—The Flora of Greenl. and its Origin*, Kgl. Danske Videnskab. Selskab. Biol. Meddel. vi. no. 3: 68 (1926).

LUZULA CAMPESTRIS (L.) DC., var. ACADIENSIS Fern., RHODORA, xix. 38 (1917). Already reported by Mrs. Kennedy (RHODORA, xxxiii. 207). Besides her stations the following may be recorded. AVALON PENINSULA: woods near Murray's Pond, 1931, *A. M. Ayre.* VALLEY OF THE EXPLOITS: damp thickets and open woods, Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 5155, 5157. ST.-PIERRE ET MIQUELON: lieux humides ou secs, bois, plaines, Cap à l'Aigle, St.-Pierre, *Arsène*, no. 159.

*L. CAMPESTRIS, var. ALPINA Gaud. *L. sudetica* (Willd.) DC. BONNE BAY: shelves and talus of diorite cliffs, Western Head, *Fernald, Long & Fogg*, no. 1512.

An arctic and subarctic variety (or species) otherwise known south of northern Labrador only on subalpine meadows of the Shickshock Mts., Gaspé.

STREPTOPUS OREOPOLUS Fern. Add to the records from HIGHLANDS OF ST. JOHN: peaty quartzite slopes, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1525.

TRILLIUM CERNUUM L. Range extended north to BONNE BAY: alluvial woods and thickets near mouth of Main River, *Fernald & Long*, no. 1527.

CYPRIPEDIUM PARVIFLORUM Salisb., var. PLANIPETALUM Fern. RHODORA, xxviii. 168 (1926).

Since the very characteristic western Newfoundland extreme has not been illustrated it is desirable to show characteristic specimens (PLATE 250). I am unable to treat the plant as a species, *C. planipetalum* (Fern.) F. Morris in Morris & Eames, Our Wild Orchids, 8, 11 (1929), a treatment only inadvertently (apparently) subscribed to by Mr. Morris, who, in discussing the plant, calls it a variety.

C. ACAULE Ait. The northern limit in Newfoundland is apparently on BONNE BAY: turfy and bushy patches on quartzite slope of Killdevil, *Fernald, Long & Fogg*, no. 1536.

HABENARIA STRAMINEA Fern. RHODORA, xxviii. 175 (1926). Extended south to ST. JOHN BAY and INGORNACHOIX BAY: peaty turf on limestone barrens northeast of Old Port au Choix, *Fernald, Long & Fogg*, no. 1541; turfy limestone barrens back of Crow's Head, no. 1542; turfy and peaty knolls bordering limestone barrens, Eastern Point, no. 1544; heathy carpets of *Cladonia*, *Empetrum*, etc., at upper borders of depressions in limestone barrens, Pointe Riche, no. 1543.

Mr. Frank Morris doubts the specific distinctness of *Habenaria straminea*, treating it as *H. albida*, var. *straminea* (Fern.) F. Morris in

Morris & Eames, Our Wild Orchids, 69, plates 23 and 24 (1929).[1] This is, of course, a matter of judgment; but if *H. dilatata* (Pursh) Hook. is kept apart from *H. hyperborea* (L.) R. Br., *H. straminea*, with as strong morphological characters and with a very distinct range, is surely a good species. If *H. straminea*, occurring wholly outside the range of *H. albida* (European), is only a variety, what possible basis is there for maintaining as species *H. macrophylla* Goldie, *H. blephariglottis* (Willd.) Hook. and *H. fimbriata* (Ait.) R. Br., species without strong morphological characters and all occurring, in a broad sense, in essentially the same ranges as their paired but earlier-published species, *H. orbiculata* (Pursh) Torr., *H. ciliaris* (L.) R. Br. and *H. psycodes* (L.) Spreng., respectively? The most conservative students, however, such as Ames (Orchidaceae, fasc. iv. and Enum. Orchids U. S. and Can.), maintain *H. dilatata*, *macrophylla*, *blephariglottis* and *fimbriata* as species.

The differences originally pointed out are maintained in the new material of *H. straminea* as well as in a series just received from Greenland: the generally greater size and thicker spike; usually longer bracts; narrower and thinner stramineous sepals, with more evident nerves; longer, thinner and definitely nerved petals; longer and thinner, clearly nerved lip; and usually longer spur. Mr. Morris's photographs well bring out the habitat: pl. 23 with *Salix vestita* Pursh and *Empetrum nigrum* L. dominant, pl. 24 with *Myrica Gale* L. dominant and *Rubus acaulis* Michx. and *Sanguisorba canadensis* apparent; but details of the flowers have not heretofore been shown. Dr. Raup and I have, therefore, photographed dried flowers (just as removed from the herbarium-specimens) of both *H. straminea* and the European *H. albida* (PLATE 251).

Habenaria straminea is certainly the Greenland and Newfoundland representative of the European *H. albida*. Whether it is a species or a strongly marked geographic variety is of minor importance as compared with the greater significance of the geographic relationship. As already stated, if it be treated merely as a variety, that status should also be given *H. dilatata;* while *H. macrophylla* and *H. fimbriata*

[1] The authorship of the combination is here ascribed to Morris since, in the preface to the book, specific reference is made to the fact that "the Eames plan of a camera record was wedded to the Morris practice of an author's pen," from which it has been inferred (in the Gray Herb. Card Index and elsewhere) that Morris was responsible for the text. This interpretation is supported by a letter from Mr. Morris, under date of January 7, 1930, with the statement: "The responsibility for the whole letter-press, as between Mr. Eames and me, is mine and undivided."

HABENARIA STRAMINEA: FIG. 1, habit, × 1, from Newfoundland; FIG. 2, flowers, × 6.
H. ALBIDA: FIG. 3, flowers, × 6, from Scotland.

HABENARIA HOOKERI, var. ABBREVIATA: habit, × 1, from TYPE collection; FLOWER (upper insert) × 2.

H. HOOKERI: FLOWER (lower insert) × 2.

should be treated as forms (differing in size only) and *H. blephariglottis* as hardly more than a color-form. Personally I am not now prepared to follow such a course, any more than I am to merge *Habenaria* with *Orchis* or to split it into monotypic or ditypic genera!

*Habenaria Hookeri Torr., var. **abbreviata**, n. var. (tab. 252), omnibus partibus quam apud formam typicam brevior; foliis oblongo-obovatis vel suborbicularibus 2.5–7 cm. longis; scapis 7–18 cm. altis; spicis 2.5–9 cm. longis; sepalo dorsali late ovato obtuso apice vix prolongato 5–7 mm. longo, sepalis lateralibus divergentibus 6–8.5 mm. longis; petalis erectis 5–7 mm. longis; labello 6–10 mm. longo deltoideo-lanceolato apice plerumque rotundato vix prolongato; calcare 9–13 mm. longo; capsulis 9–14 cm. longis.—Northwestern Newfoundland, on limestone barrens bordering St. John Bay and Ingornachoix Bay: with *Empetrum nigrum*, *Vaccinium uliginosum* var. *alpinum*, etc. in peaty turf on limestone barrens, Old Port au Choix, July 21, 1929, *Fernald, Long & Fogg*, no. 1549; with *Empetrum nigrum* and *Juniperus communis* var. *montana* on peaty knolls in limestone barrens, Old Port au Choix, July 22, 1929, *Fernald, Long & Fogg*, no. 1550; with *Empetrum nigrum*, *Juniperus communis* var. *montana*, etc. on dry peaty knolls in limestone barrens back of Crow's Head, St. John Bay, July 23, 1929, *Fernald, Long & Fogg*, no. 1551; peaty knolls on limestone barrens, Pointe Riche, July 24, 1929, *Fernald, Long & Fogg*, no. 1552; turfy and peaty knolls bordering limestone barrens, Eastern Point, St. John Bay, July 25, 1929, *Fernald, Long & Fogg*, no. 1553 (**type in Gray Herb.**).

Habenaria Hookeri var. *abbreviata* (plate 252, habit and upper insert) differs from typical continental American *H. Hookeri* (lower insert) in its shorter dimensions in every part, in the yellower color of its flowers, in the blunter upper sepal which shows only a slight tendency to the prolonged tip so often seen in the continental plant, and in the more gradually narrowed lip. Its habitat, with arctic-alpine xerophytes on limestone gravel, is so unlike the conventional habitat, in acid woodland humus on the continent, that one would at first feel impelled to consider it a distinct species. It exhibits, however, no definite morphological characters by which it can be specifically separated, although it is as clearly segregated from *H. Hookeri* as is *H. macrophylla* from *H. orbiculata*, so-called species without marked geographic segregation.

As stated, the plant of the limestone barrens of northwestern Newfoundland differs from typical *Habenaria Hookeri* by its smaller size in all parts. These contrasts are brought out in the photographs made by Dr. Raup; and measurements taken from the 64 individuals

of var. *abbreviata* collected and from the 157 individuals of typical *H. Hookeri*, as represented in the Gray Herbarium and the herbarium of the New England Botanical Club (ranging from southeastern New Brunswick to central Maine and Montreal and west to southern Ontario, Michigan and Pennsylvania), give the following contrasts.

H. HOOKERI (typical): leaves 5–16 cm. long; scape (including spike) 1.7–4.5 dm. high; spike 5–25 cm. long; upper sepal 7–11 mm. long; lateral sepals 8.5–11.5 mm. long; petals 6–9 mm. long; lip 9–13 mm. long; spur 1.4–2.6 cm. long; capsules 1.5–2.2 cm. long.

Var. ABBREVIATA: leaves 2.5–9 cm. long; scape 0.7–1.8 dm. high; spike 2.5–9 cm. long; upper sepal 5–7 mm. long; lateral sepals 6–8.5 mm. long; petals 5–7 mm. long; lip 6–10 mm. long; spur 0.9–1.3 cm. long; capsules 0.9–1.4 cm. long.

Although the Newfoundland plant is rather sharply differentiated from typical *Habenaria Hookeri* in the size of all its parts, there is a transitional series at the extreme northeastern limit of the species on the continent. All the material I have seen from Aroostook County, Maine and from the region just to the north in Temiscouata, Rimouski, Charlevoix and extreme western Saguenay Counties, Quebec has the short spur and lip of var. *abbreviata*, but in size of sepals and leaves and in stature it is as large as in typical *H. Hookeri*, the spurs being 9–14 mm. long, the upper sepal 7–9 mm. long, the lip 7.5–10 mm. long, but the leaves 6–12 cm. long, the spikes 0.6–2.2 dm. long; and occasional specimens from northern Vermont and northern New York indicate a similar transition. The only material at hand from the Magdalen Islands is overripe and with a very short fruiting spike; but it has lost the distinctive parts of the flowers.

H. ORBICULATA (Pursh) Torr. Frequent on the West Coast, occasional southward across the Island, as often in open as in wooded habitats (see pp. 8, 87 and MAP 9). The northernmost station is on BONNE BAY: in turf of *Scirpus cespitosus* var. *callosus* and in sphagnum, wet peaty bog-barrens at 400–550 m. alt., Lookout Mt., *Fernald, Long & Fogg*, no. 1554.

The western Newfoundland plants, like those from the Shickshock Mts. in Gaspé are very small, as compared with the large woodland plants of New England and the upland to North Carolina—leaves 4–9 cm. broad, scapes 1.5–2.5 dm. high, with racemes only 5–12 cm. long. I am unable to find any tangible character to separate this extreme series from the larger Alleghenian plant and particularly from the plants of western North America. In Newfoundland we, as yet, know *H. macrophylla* Goldie only from the extreme southeast, the Avalon Peninsula.

H. LACERA (Michx.) R. Br., var. TERRAE-NOVAE Fern. RHODORA, XXVIII. 21 (1926). Range extended north to BONNE BAY: tableland of Lookout Mt.

H. PSYCODES (L.) Spreng. The northern limit seems to be on BONNE BAY: extremely abundant, dominant, occurring in many thousands of individuals on meadows and peats both at sea-level and on the tablelands.

The combination *Habenaria psycodes* was first made in Spreng. Syst. iii. 693 (1826) and, nomenclaturally, the combination rests upon *Orchis psycodes* L. (1753); therefore, the combination should be referred to (L.) Spreng., even though Sprengel was confused as to the exact application of the name.

POGONIA OPHIOGLOSSOIDES (L.) Ker. The northern limit in western Newfoundland seems to be on BONNE BAY: wet peaty barrens at about 395 m., Lookout Mt., *Fernald, Long & Fogg,* no. 1556.

CALOPOGON PULCHELLUS (Sw.) R. Br. The northern limit in western Newfoundland is apparently on BONNE BAY: very rare on wet peaty barrens at about 365 m., Lookout Mt., *Fernald, Long & Fogg,* no. 1557.

Calopogon pulchellus is certainly not as common in western Newfoundland as *Pogonia ophioglossoides* and *Arethusa bulbosa.* It is, judging from collections made by others, apparently commoner in the eastern half of the Island, especially about Notre Dame Bay. Of the five collections in the Gray Herbarium from western Newfoundland, four were particularly noted by their collectors as rare: Lookout Mt., Bonne Bay, "very rare"; Lark Harbor, Bay of Islands (*Fernald, Long & Fogg,* no. 201), "very rare"; Blomidon (*Mackenzie & Griscom,* no. 10,226), "scarce"; Port aux Basques (*Fernald, Long & Dunbar,* no. 26,542), "very scarce."

*LISTERA BOREALIS Morong. ST. JOHN BAY: pastured spruce woods and thickets, Eddy's (Old Man's) Cove, *Fernald, Long & Fogg,* no. 1560.

A characteristic individual of this species, well known from Anticosti and the Mingan Islands, was found by Long in an area close to shore (the habitat on Anticosti and the Mingans), where, most unfortunately, the cattle had wrought almost complete destruction. Search in the region, extending along the coast for several miles, failed to bring to light another specimen. See pp. 60, 61.

MALAXIS BRACHYPODA (Gray) Fern. RHODORA, XXVIII. 176 (1926). Apparently more abundant in western Newfoundland than in most areas on the continent, often in colonies of hundreds (sometimes thousands) of plants.

This species is so sharply distinguished from the Eurasian *Malaxis monophyllos* (L.) Sw. that, now that its characters have been pointed out, it is surprising to see it united again with the Eurasian (and Alaskan) plant, as *M. monophyllos*, var. *brachypoda* (Gray) F. Morris in Morris & Eames, Our Wild Orchids, 358, plates 110 and 111 (1929). The more important diagnostic points, as already summarized, are:

M. MONOPHYLLOS. Flower-bud just before expanding ovate-lanceolate, 2–3 mm. long: pedicel and ovary during anthesis 2.5–4 mm. long: expanded perianth 4–6.5 mm. broad: flower resupinate, the lip and lateral sepals subconnivent and projected forward: capsules 5–7 mm. long, on twisted pedicels 3–5 mm. long, crowned by the subconnivent ascending perianth-segments.

M. BRACHYPODA. Flower-bud just before expanding ovate, 1.5–2 mm. long: pedicel and ovary during anthesis 1.5–3 mm. long: expanded perianth 3–5 mm. broad: perianth-segments (including lip) strongly divergent, perpendicular to the axis of the ovary, finally reflexed and appressed to the ovary, the lip drooping: capsules 3–5 mm. long, on straight pedicels 1–2 mm. long, crowned by the reflexed and appressed perianth-segments.

Since the clear differences have not been wholly appreciated (the plants being insignificant), it seems desirable to make them clear by photography. In PLATE 253 enlarged details of the two are displayed side-by-side.

These differences, with complete geographic isolation, certainly are specific. I am not familiar with the Old World *Malaxis monophyllos* growing nor sufficiently conversant with folk-lore as to know whether the English name used by Morris, "White Adder's Mouth," applies to the European plant. As a pseudonym for our plant with greenish-yellow flowers it is not descriptive.

SALIX LUCIDA Muhl., var. INTONSA Fern. Extending north to BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *Fernald & Long*, no. 1577.

*S. UVA-URSI Pursh, forma **phyllolepis**, f. nov., bracteis (squamis) amentorum foliaceis; ovariis abortivis. PORT AU PORT BAY: dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., August 16, 1910, *Fernald, Wiegand & Kittredge*, no. 3171 (TYPE in Gray Herb.).

S. HERBACEA L. Additional stations from the HIGHLANDS OF ST. JOHN: mossy shelves of quartzite cliffs at head of Yellow Brook, Doctor Hill, and shelves of cliffs at head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1588, 1589.

S. CORDIFOLIA Pursh, var. CALLICARPAEA (Trautv.) Fern. RHODORA, XXVIII. 184 (1926). Extended south to BONNE BAY: large shrubs, up to 2 dm. high, damp thicket under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1597.

S. CORDATA Muhl. Extended north to BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *Fernald & Long*, no. 1594.

Malaxis brachypoda: fig. 1, habit, × 1 from Newfoundland; fig. 2, flowers, showing drooping lip, × 4, from Herkimer Co., New York; fig. 3, fruit, showing reflexed perianth, × 4, from Maine; fig. 4, expanding buds, × 4, from Quebec. M. monophyllos: fig. 5, flowers, showing erect lip, × 4, from Switzerland; fig. 6, fruit, showing projecting shriveled perianth, × 4, from Russia; fig. 7, buds, × 4, from Bavaria.

S. PEDUNCULATA Fern. RHODORA, XXVIII. 188 (1926). Extended south from the Straits of Belle Isle to POINTE RICHE: damp open depressions in limestone barrens, *Fernald, Long & Fogg*, no. 1595, heavily fruiting shrubs with decumbent branches, and aments up to 1 dm. long; no. 1596, same habitat, shrubs sterile (presumably staminate), more ascending, up to 1 m. high.

S. GLAUCOPHYLLOIDES Fern. The northern limit is apparently on BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *R. H. Kimball*, no. 15; *Fernald & Long*, nos. 1598, 1599.

SALIX (§ CHRYSANTHEAE) **Wiegandii**, n. sp. (TAB. 254), frutex depressus vel adscendens 1–3 dm. altus *S. lanatam* simulans; ramis ramulisque decumbentibus vel adscendentibus crassis castaneis deinde cinereis juvenilibus cano-tomentosis; gemmis bene evolutis ovoideis apice rotundatis 5–6 mm. longis cano-tomentosis; foliis ovalibus vel oblongis deinde 1.5–4.5 cm. longis 0.4–2.8 cm. latis rigido-coreaceis utrinque sparse floccoso-lanatis integris margine revolutis venis subtus prominentibus scrobiculato-reticulatis, petiolis crassis lanatis 3–8 mm. longis; stipulis oblique cordato-ovatis coriaceis plerumque glanduloso-serratis subtus reticulatis 0.2–1.2 cm. longis; amentis femineis breviter pedunculatis pedunculo foliis 3–4 munito 2.7–6 cm. longis 1–1.5 cm. crassis densifloris, pedunculo rhachique villosis vel villoso-tomentosis; bracteis (squamis) obovatis obtusis atris 2–2.5 mm. longis pilis cinereis vel sordidis crispato-villosis; capsulis lanceolato-conicis 6–7 mm. longis sparse villoso-tomentosis vel glabratis subsessilibus, stylo elongato tenui 2 mm. longo, stigmatibus integris 0.5–0.7 mm. longis; glandula bractea breviora; amentis masculis 1–1.5 cm. longis; filamentis glabris.—Western NEWFOUNDLAND, in the region bordering St. John Bay and Ingornachoix Bay: damp rocky limestone barrens, near sea-level, Ingornachoix Bay, August 4, 1910, *Fernald, Wiegand & Kittredge*, no. 3185 (mature foliage and buds); trailing on turfy talus of limestone headland, Gargamelle Cove, Ingornachoix Bay, July 20, 1929, *Fernald, Long & Fogg*, no. 1602—flowering pistillate shrubs (TYPE in Gray Herb.); turfy and peaty margins of dry gravelly limestone barrens, Old Port au Choix, St. John Bay, July 22, 1929, *Fernald, Long & Fogg*, nos. 1603 (fruiting) and 1604 (with shriveled staminate ament showing glabrous filaments); damp open depressions in limestone barrens, Pointe Riche, July 24, 1929, *Fernald, Long & Fogg*, no. 1605 (fruiting).

Although the original sterile material of *Salix Wiegandii* was labelled as collected by *Fernald, Wiegand and Kittredge*, it was actually found by Prof. Wiegand and Mr. Kittredge, since I was at that date on the Labrador coast (our specimens of 1910 and 1911 being "pooled," we followed the practice, now found to be unfortunately misleading, of using a joint label for all collections whether jointly or individually made). *S. Wiegandii*, now secured in both flower and fruit, proves to

be a most distinct species with which it is a keen pleasure to associate the name of its discoverer.

Salix Wiegandii is a most interesting new member of § *Chrysantheae* Koch (§ *Lanatae* Koehne) not closely related to any known member of that boreal group. It occurs in the same region as *S. calcicola* Fern. & Wieg. and like that species has very short staminate aments (the staminate aments of *S. calcicola,* heretofore undescribed but now known through 7 collections, being 1.5–2.5 cm. long) and pistillate aments of about the same size as in *S. calcicola;* but in most characters the two are thoroughly distinct. The young branchlets of *S. calcicola* are villous, of *S. Wiegandii* lanate; the leaves of *S. calcicola* glabrous or quickly glabrate, in expanding sometimes loosely villous, and of a broad-ovate to suborbicular outline, the leaves of *S. Wiegandii* permanently lanate upon both surfaces and of an oval to oblong or slightly obovate outline; the large stipules of the vigorous shoots in *S. calcicola* taper subequally to base, those of *S. Wiegandii* are conspicuously inequalateral at the cordate base; the sessile aments of *S. calcicola* are from terminal or subterminal blackish and villous buds of the preceding year, the short peduncled and leafy-bracted aments of *S. Wiegandii* from axillary pale-brown and lanate buds; the capsules of *S. calcicola* are glabrous from the first, of *S. Wiegandii* mostly pubescent (at least at base) to maturity.

From the other American members of § *Chrysantheae, Salix Wiegandii* is at once distinguished. The only other member of the section known in eastern America is *S. laurentiana* Fernald, a small tree or tall shrub with the large leaves (up to 2 dm. long) crenate and on petioles mostly 1–2 cm. long, with aments up to 9 cm. long,[1] bracts (scales) oblong and brown and styles only 0.5–1 mm. long. *S. Richardsoni* Hook. of the Mackenzie and Alaskan area has villous-hirsute branchlets, staminate aments 3–4.5 cm. long, glabrous foliage, lanceattenuate and long-persistent stipules up to 2.5 cm. long and glabrous

[1] Dr. Camillo Schneider (Journ. Arn. Arb. i. 222), discussing *S. laurentiana*, suggests correction of the original description of the species, saying: "Fernald . . . says that the fruiting aments measure up to 9 cm. in length, while I have not seen any longer than 7 cm." The original collection of *Fernald & Collins* no. 202 (type number of *S. laurentiana*) consisted of 30 sheets, from which the description was drawn. The sheet retained in the Gray Herbarium did not have aments of the greatest length, but the sheet which went to the late Dr. G. G. Kennedy and which is now preserved at the Gray Herbarium shows an ament 8.5 cm. long; while among the 11 more recently collected numbers of *S. laurentiana* which Dr. Schneider has not examined there are several with aments fully 9 cm. long. The mature aments may reach a thickness of more than 2 cm., with capsules 1 cm. long.

capsules; *S. Wiegandii* can hardly be confused with it. *S. Barrattiana* Hook. of the Canadian Rocky Mountains is somewhat approached by *S. Wiegandii*, but its leaves have more sericeous-tomentose surfaces without the strong reticulation so conspicuous in *S. Wiegandii*, the stipules are semi-ovate and glabrous, the staminate aments 5 cm. long, and the pistillate up to 1 dm. long. *S. Tweedyi* (Bebb) Ball, originally from Big Horn Mountains, has glabrous and glandular-serrate leaves, glabrous capsules and usually forked stigmas. *S. Hookeriana* Barratt of the Pacific Coast is, like *S. laurentiana* of the eastern coast, a tree or large shrub, with the branchlets densely villous-tomentose, the leaves green and glabrate above and densely white-pubescent but scarcely reticulate beneath, stipules wanting or inconspicuous and styles short, as in *S. laurentiana*. *S. Piperi* Bebb of Washington and Oregon is, likewise, a large shrub, with short styles as in *S. laurentiana* and *S. Hookeriana;* it has glabrous branches, glabrous and serrulate leaves and long aments and is not closely approached by *S. Wiegandii*. *S. amplifolia* Coville of Alaska is also a tree, with densely villous branchlets, villous and glabrate obovate leaves, no conspicuous stipules, very long aments, glabrous capsules and very long styles (3–4 mm.); it is certainly not strongly approached by *S. Wiegandii*. *S. alaxensis* (Anderss.) Coville is also a tree or erect shrub, having the branches glabrous or villous or villous-lanate even when old, the leaves densely white-pannose beneath, the stipules linear to filiform and subentire and the aments very long (up to 1.4 dm.); it is not at all approached by *S. Wiegandii*.

S. Wiegandii seems to be as close to the arctic-alpine *S. lanata* L. of Eurasia as to any American member of the section; but *S. lanata* is a larger and usually less depressed shrub, with villous (instead of tomentose) branchlets, larger and more rounded to obovate leaves, much larger and persistent (as in *S. Richardsoni*) stipules, sessile mostly terminal and subterminal aments, the staminate much larger than in *S. Wiegandii*, bracts or scales with the long villous beard golden-yellow or cinereous, glabrous capsules and longer and often forking stigmas.

Salix **ancorifera**, n. sp. (fig. 1), frutex *S. discolorem* simulans; ramulis novellis glabris fuscis nitidulis; foliis immaturis membranaceis anguste obovalibus 1.5–2.7 cm. longis, 0.5–1.5 cm. latis, juvinilibus minute rufescenti-pilosis glabratis costis utrinque

Fig. 1. Pistillate flower of Salix ancorifera, × 4.

strigoso-pilosis marginibusque remote glanduloso-dentatis piloso-ciliolatis exceptis; amentis femeneis coetaneis breviter pedunculatis in anthesi 3.5–4.5 cm. longis 1.2–1.5 cm. crassis densifloris; pedunculis 5–8 mm. longis foliis 2–4 bracteiformibus munitis, pedunculo rhachique sericeo-pilosis; bracteis oblongis 3.5–4.5 mm. longis fulvis longe cinereo-villosis; ovariis subulato-attenuatis 5–6 mm. longis breviter cinereo-pilosis pilis nitidis; stylo 1 mm. longo, stigmatibus subulatis basi crassis valde recurvatis 1.5–2 mm. longis; pedicellis vix 1 mm. longis glandulam crassam paulo superantibus.—Western NEWFOUNDLAND: woods, McIver's Cove, Bay of Islands, May 31, 1898, *A. C. Waghorne*, no. 38, distributed as *S. phylicifolia* L. (TYPE in Gray Herb.).

Salix ancorifera for more than thirty years has been a perplexing plant. Originally labeled *S. phylicifolia*, it was later identified by me[1] as the problematic *S. Barclayi* **S. latiuscula* Anderss. Mon. Sal., Kongl. Svenska Vet.-Akad. Handl. vi. no. 1: 165 (1867) or *S. Barclayi*, *β. latiuscula* Anderss. in DC. Prodr. xvi.[2] 255 (1868),[2] while Mr. C. R. Ball has marked the specimen *S. discolor*. As Schneider has pointed out in Journ. Arn. Arb. i. 152 (1920), the Waghorne specimen can hardly be what Andersson described as *S. latiuscula*. The latter, a single specimen in the DeCandolle herbarium, collected in Newfoundland by De la Pylaie, was described with very slender nectary ("nectarium valde tenue"), but the nectary of the Waghorne specimen is very broad and stout. Schneider emphasizes that "As to the stigmas there is no mention in either of Andersson's rather long descriptions" but since Andersson stated in 1868 that *S. Barclayi* is similar, but differs in having the capsules glabrous, it is to be inferred that *S. latiuscula* has the short stigmas of *S. Barclayi*. As a matter of fact Andersson *did* describe the stigmas of *S. latiuscula*, in the fourth line of each of his two descriptions: "stylo brevi stigmatibus bifidis." Since the Waghorne specimen has simple and remarkably elongate and recurved stigmas (FIG. 1) and since its nectary as well as the toothing of the leaves and the long pubescence of the midrib so far depart from the characters of *S. latiuscula*, as described by Andersson, it seems advisable to give the shrub of McIver's Cove a definite name.[3] For the sketch (FIG. 1) I am indebted to Dr. Lyman B. Smith.

[1] Fernald, RHODORA, XVI. 175 (1914).

[2] Andersson seems to have been quite uncertain about the status of this plant. He originally published it with a binomial, as above, but appended without number to his numbered account of *S. Barclayi;* but the next year he treated it unequivocally as a variety of *S. Barclayi*. *S. latiuscula* was taken up as a definitely published species in *Index Kewensis* and I so considered it in 1914.

[3] It is not yet clear just what De la Pylaie collected as the basis of *S. latiuscula* or *S. Barclayi, β latiuscula*. According to Schneider, "Unfortunately the type is wanting in Herb. DeCandolle at Geneva from which Andersson had received it."—Journ. Arn. Arb. iii. 73 (1921). Like *S. ancorifera* and several other endemic willows of Newfoundland it is probably highly localized and perhaps now exterminated.

SALIX WIEGANDII, × 1: FIG. 1, mature branchlet; FIGS. 2 and 3, flowering (pistillate) branchlets.

From *S. discolor* Muhl. which *S. ancorifera* simulates, it is distinguished not only by the very long and characteristically recurved stigmas, but by the glandular toothing of its leaves and by the peculiar long pubescence of the midrib; the erect or merely divergent stigmas of *S. discolor* being only half as long as in *S. ancorifera* and the leaves never displaying the long pubescence on the midribs.

Whether *Salix ancorifera* is still growing at McIver's Cove is doubtful. When Waghorne was there in 1898, there were only a few settlers; now there is a considerable village and much of the better land in the region has been put under cultivation. In early July, 1929, Messrs. Long, Fogg and I went to McIver's Cove for fruiting material. The older inhabitants well remembered Waghorne and his visit there; but no one in the village had ever seen or heard of a *wild* willow. They had plenty of *S. viminalis* planted, but a search of several hours, in which we had the enthusiastic coöperation of the helpful population, indicated that the statement given us upon first landing, that no native willow now grows there, is apparently correct. This excessive localization of relic-endemic willows in Newfoundland is quite in keeping with the extreme localization there and in Gaspé of many other relic-endemics. Thus *Salix leiolepis* Fernald, "a very peculiar species" (Schneider, Bot. Gaz. lxvii. 46), is known only from the type-collection from Table Mountain, Port au Port Bay; *S. chlorolepis* Fernald is known from only a single brook-valley on Mt. Albert in Gaspé; *S. amoena* Fernald, only from a single cove on Ha-Ha Bay, Straits of Belle Isle; *S. pedunculata* Fernald, from but two stations in northwestern Newfoundland; *S. obtusata* Fernald, a "remarkable species . . . of which much more copious material is needed to decide the question of its true relationship" (Schneider, Journ. Arn. Arb. i. 171), only from a single very limited stretch of river-gravel in Gaspé; *S. Wiegandii* (above described), only from the barrens near Old Port au Choix; and *S. latiuscula* Anderss., as yet not rediscovered and with the type-specimen lost, is apparently quite as rare. See p. 48.

(To be continued)

LIBRA
OF
WASHIN
UNIVER
ST. LOUIS.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 247*)

Corylus cornuta Marsh. Range extended north to Bonne Bay: margins of thickets and woods, alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1627.

Arceuthobium pusillum Peck. Extended north to Bonne Bay: on *Picea mariana*, Deer Brook, *Fernald, Long & Fogg*, no. 1656; Main River, *Fernald & Long*, no. 1657.

Oxyria digyna (L.) Hill. Extended southward to southern entrance to Bonne Bay: shelves and talus of diorite cliffs (essentially at sea-level), Western Head, *Fernald, Long & Fogg*, no. 1658. See p. 93 and map 11.

*Polygonum allocarpum Blake, Rhodora, xix. 234 (1917). District of Burgeo and La Poile: cobbly barrier-beach, Great Barachois (or Barasway Bay), *Fernald, Long & Fogg*, no. 228.

An extension north from Nova Scotia.

Salsola Kali L., var. caroliniana (Walt.) Mett. District of Burgeo and La Poile: with the pubescent form, upper border of sandy beach, Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 242.

Previously known from the Bay of Islands.

Arenaria marcescens Fern. To the stations already recorded add Bay of Islands: crests of dry serpentine ridge, North Arm, *Long & Fogg*, no. 250.

The species is on all the serpentine areas of western Newfoundland. Plate 255 shows flowering and fruiting branches, life-size, and seeds × 10.

A. cylindrocarpa Fern. Plate 256. Apparently on all the more exposed limestone or serpentine areas of the West Coast.

The plate shows small fragments of the extensively creeping *A. cylindrocarpa* and a small plant of *A. norvegica* Gunn. with which it has been confused; also characteristic mature fruits × 6, and seeds × 10. See p. 11.

Stellaria crassifolia Ehrh. The Newfoundland range extended south to St. John Bay: springy and mossy glades in spruce and larch swamp, Eastern Point, *Fernald, Long & Fogg*, no. 1680.

Cerastium Fischerianum Seringe. Extended south from the Straits to St. John Bay and Ingornachoix Bay: wooded talus of limestone cliff, Crow's Head, *Fernald, Long & Fogg*, no. 1684; dry peaty and turfy limestone barrens, Gargamelle Cove, no. 1683.

C. terrae-novae Fern. & Wieg. See p. 11, plate 257. Apparently on all the serpentine areas of the West Coast.

The plate shows a small plant, life-size, and seeds × 10.

C. VISCOSUM L. DISTRICT OF BURGEO AND LA POILE: roadsides, pastures and grassy banks, Burgeo, *Fernald, Long & Dunbar*, no. 26,675, *Fernald, Long & Fogg*, no. 260.

Although recorded by Waghorne and others from Newfoundland, the constant mixture in literature of *C. viscosum* and *C. vulgatum* L. makes it desirable to put a verified station on record.

LYCHNIS ALPINA L. To the stations already recorded add BAY OF ISLANDS: southerly slopes of dry serpentine ridge, North Arm, *Long & Fogg*, no. 263.

*SILENE ACAULIS L., var. EXSCAPA (All.) DC., forma CAULESCENS (Vaccari) Fiori. BONNE BAY: shelves and talus of diorite cliffs, Western Head, *Fernald, Long & Fogg*, no. 1693.

Var. *exscapa*, the common form in eastern America, has the flowers and fruiting capsules scarcely exserted from the leafy tips. Forma *caulescens* has calyx and capsule of var. *exscapa*, but the flowers well elevated on peduncles rising 1 cm. or more above the leafy mat. See p. 94.

THALICTRUM ALPINUM L.

In its simple, mostly scapose stems and slender racemes and its tiny dark and lustrous upper leaf-surfaces *Thalictrum alpinum* is unique, yet by a singularly innaccurate statement in American keys it would ordinarily be difficult to make a determination of the plant. In the *Synoptical Flora* (i. fasc. 1: 14) *T. alpinum* is said to have "Flowers hermaphrodite"; and in Britton & Brown's *Illustrated Flora* (ii. 86) *T. alpinum* and *T. clavatum* are separated in the key from other species by having "Flowers perfect," while in Trelease's detailed paper on the genus (Proc. Bost. Soc. Nat. Hist. xxiii. 297), upon which later treatments have been largely based, these species are said to have "Flowers all perfect." Nevertheless, *T. clavatum* is, as originally described by De Candolle, ordinarily monoecious and, in spite of the key-character and the description, it is so illustrated in the *Illustrated Flora*. Some herbarium-specimens indicate that it may rarely be dioecious, but perfect flowers are highly exceptional. Similarly, *T. alpinum* is so generally dioecious that monoecious colonies or plants are unusual and hermaphrodite or perfect flowers very exceptional. The dioecious character of *T. alpinum* is well brought out in the figure in the *Illustrated Flora*, although the text calls for "flowers perfect."

ANEMONE MULTIFIDA Poir. (var. HUDSONIANA DC., hardly separable from the typical form). The Newfoundland stations are so few that

ARENARIA MARCESCENS: FIG. 1, fragments, in flower, × 1, from Mt. Albert, Quebec; FIG. 2, fruit, × 1, from the TYPE, Blomidon, Newfoundland; FIG. 3, seeds, × 10, from the TYPE.

the following additional ones are worthy of note. BONNE BAY: limestone cliffs and talus, Tucker's Head, *Fernald, Long & Fogg*, no. 1709; turfy limestone crest (alt. 650 m.), Killdevil, no. 1710. LOWER HUMBER VALLEY: dominant in dry humus over limestone ledges and shingle, Hannah's Head, no. 1708, well-developed plants with 16 or more heads. See p. 47.

*COCHLEARIA GROENLANDICA L. PISTOLET BAY: wet rocky beaches, Raleigh, *Anne M. Jeffers*, no. 91.

Characteristic of the outer coast of Labrador, but not previously found in Newfoundland where the common species are *C. tridactylites* Banks and *C. cyclocarpa* Blake.

CARDAMINE PRATENSIS L., var. PALUSTRIS Wimm. & Grab. Already known from southeastern Newfoundland but not clearly vouched for heretofore from the West Coast. BAY of ISLANDS: along spring-rill in thicket at base of Mt. Moriah, *Fernald, Long & Fogg*, no. 1720. See p. 15.

*C. FLEXUOSA With. LOWER HUMBER VALLEY: wet springy banks and thickets, Humbermouth, *Fernald, Long & Fogg*, no. 1721; springy and bushy slopes between Marble Mountain and Humbermouth, no. 1722. See p. 16.

A typical Eurasian species, new to North America; clearly indigenous, with characteristic endemic American plants of wet or springy banks. Quickly distinguished from the variable American *C. pensylvanica* Muhl. by its definitely petiolulate leaflets. Although appearing in every way indigenous on the lower Humber, *C. flexuosa* has been collected by Mrs. Ayre in a park at St. John's where it was possibly introduced.

LESQUERELLA **Purshii** (Wats.), n. comb. *L. arctica*, var. *Purshii* Wats. Proc. Am. Acad. xxiii. 254 (1888) and in Gray, Syn. Fl. N. Am. i.[1] 120 (1895); Fernald, RHODORA, xiii. 223 (1911); Payson, Ann. Mo. Bot. Gard. viii. 157 (1921). PLATE 258.

When Watson distinguished the plant of Anticosti as var. *Purshii* he recognized only two points of departure from the Greenland and arctic American *L. arctica* (Wormsk.) Wats.: "Pod somewhat pubescent; septum complete," as contrasted with the glabrous pod and fenestrate septum of the arctic plant. Later, Payson, in his *Monograph of the Genus Lesquerella*, stated in regard to the perforate septum, that "This character is apparently of no value, since specimens of typical *arctica* are at hand that show no perforations."[1] Payson, however, stated that var. *Purshii* (then known from western Newfoundland as well as Anticosti) is a "more slender plant . . . with narrower

[1] Payson, Ann. Mo. Bot. Gard. viii. 157 (1921).

leaves . . . the variety seems to have but 5–6 ovules in each cell, while the species has 6–8."

Since Watson's day, and even since Payson's, the material in the Gray Herbarium has vastly increased; when Payson studied the group we had 13 numbers of the two plants, now we have 45. With the large increase of material it becomes possible better to evaluate the differences and the similarities. As Payson says, the plant of Anticosti and Newfoundland tends to be more slender and to have narrower leaves: the rosette-leaves are narrowly oblanceolate and very slenderly petioled, those of the arctic plant broadly oblanceolate to spatulate. In *L. arctica* the raceme is short and corymbiform or subcorymbiform, with little tendency to elongate, the fruiting pedicels loosely ascending or spreading and commonly arcuate, the longest 1.4–2.6 (av. 1.6) cm. long; in the plant of the Gulf of St. Lawrence the raceme may be subcorymbiform but, when well developed, it becomes an elongate and stiff slender raceme, with ascending to stiffly spreading short and straight pedicels, the longest only 2–16 (av. 8) mm. long. The sepals of *L. arctica* taper gradually to the subacute tip; in *L. Purshii* they are gradually rounded at tip. The petals of *L. arctica* are rather marcescent, enveloping the capsule until it is nearly grown; in *L. Purshii* they quickly shrivel and have usually dropped before the young fruit is much distended. The capsules of *L. arctica* are glabrous, 6–9 mm. long and contain 6–8 seeds in each cell; those of *L. Purshii* oftenest lepidote (though sometimes glabrate) and averaging much smaller, 3.5–7 mm. long, with 4, 5 or 6 seeds in each cell. Although, as Payson says, the usually fenestrate septum of *L. arctica* may be complete, the fenestration is common and the opening large, while in *L. Purshii* the perforation only rarely occurs and it is then smaller than in *L. arctica.*

Differing, at least recognizably, in so many characters and isolated by more than 7 degrees of latitude, the two plants seem to be fairly segregated species. Their differences are summarized below.

L. ARCTICA. Rosette-leaves broadly oblanceolate to spathulate, broad-petioled: raceme corymbiform or subcorymbiform; the fruiting pedicels loosely ascending to spreading, often arcuate, the longest 1.4–2.6 (av. 1.6) cm. long: sepals gradually narrowed to subacute tip: petals subpersistent, often enveloping the nearly grown fruit: capsules glabrous, 6–9 mm. long, with 6–8 seeds in each cell: septum usually fenestrate, the perforation roundish or oval—Greenland and Arctic America, south to Rama (lat. 58° 43′), Labrador.

L. PURSHII. Rosette-leaves narrowly oblanceolate, slenderly pet-

ioled: raceme corymbiform to elongate, slender and stiff, with ascending to spreading straight pedicels, the longest 2–16 (av. 8) mm. long: sepals rounded at tip: petals soon shriveling, deciduous before the distension of the fruit: capsules lepidote, sometimes glabrate, rarely glabrous, 3.5–7 mm. long, with 4–6 seeds in each cell: septum usually complete, the perforation, when it occurs (not to be confused with rupturing), narrow and elongate.—Western Newfoundland and Anticosti Island, Quebec. NEWFOUNDLAND: dry gravelly limestone barrens, Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 28,336; dry gravel of limestone barrens, Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 28,337; dry mixed gravel on crest southwest of Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,338; gravelly limestone barrens back of Big Brook, Straits of Belle Isle, *Pease & Griscom*, no. 28,334; limestone barrens west of Big Brook, *Long & Gilbert*, no. 28,335; dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,339; dry gravelly or shingly limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 1724; dry gravelly limestone barrens, Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 1725; limestone barrens, Pointe Riche, *Fernald & Wiegand*, no. 3464; limestone cliffs and talus, Tucker's Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1726; dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mountain, Port au Port Bay, *Fernald & Wiegand*, no. 3465, *Fernald & St. John*, nos. 10,835, 10,836 and in Pl. Exsicc. Gray. no. 216, *Mackenzie & Griscom*, no. 10,290; dry limestone barrens, Green Gardens, Cape St. George, *Mackenzie & Griscom*. Anticosti Island, QUEBEC: *Pursh;* platières de l'embouchure, Rivière Jupiter, *Victorin & Rolland*, no. 24,851; sur les platières récontes, Riv. Chicotte, *Victorin & Rolland*, no. 27,146; sur les platières, Riv. McKane, *Victorin & Rolland*, no. 27,262.

The close relationship of the arctic species in numerous genera and of their endemic representatives about the Gulf of St. Lawrence with an isolated species of southern South America has repeatedly been pointed out. It is therefore noteworthy that the nearest relative of *Lesquerella arctica* and *L. Purshii* should be South American. As early as 1829, Hooker identified the Andean plant as *Vesicaria arctica:* "nor can I distinguish from *V. arctica*, specimens I have in my Herbarium, gathered in the plains of Mendoza and hills above Cordova, South America, by Dr. Gillies and Mr. Cruikshanks."[1] There has been much confusion of the one to three species of *Lesquerella* in South America and their identity is still rather vague. The Gillies plant, represented in the Gray Herbarium by a full sheet collected in 1825 from "Half-way between Fort San Rafael & El Puerto del

[1] Hook. Fl. Bor.-Am. i. 48 (1829).

Monte" in the Andes is a good match for the original plate of *Vesicaria montevidensis* Eichl. in Mart. Fl. Bras. xiii[1]. 302, t. 67, fig. 2 (1865), said to come from Montevideo. Some authors reduce *Lesquerella montevidensis* (Eichl.) Wats. to *L. mendocina* (Phil.) Kurtz, but the material at hand indicates that Payson is right in keeping them apart. *L. montevidensis* is placed by Payson next to *L. arctica* and *L. Purshii* (*L. arctica*, var. *Purshii*). It has the elongating raceme, ascending pedicels and slightly elongate pods like those of *L. Purshii;* but its leaves incline to be sinuate, its flowers are much larger, the pubescence of the pods is a fine stellate tomentum, and its styles are slightly longer than in *L. Purshii.*

Draba megasperma Fern. & Knowlt. Range in western Newfoundland extended south to St. John Bay: turf overlying limestone, Grassy Island, *Fernald, Long & Fogg,* no. 1731; dry gravelly limestone barrens, Eastern Point and Eddy's (Old Man's) Cove, nos. 1737, 1748½. In eastern Newfoundland known as far south as Notre Dame Bay: rocky shore, Pike's Arm, *Fernald, Wiegand & Bartram,* no. 5458.

D. arabisans Michx., var. orthocarpa Fern. & Knowlt. Extended north from Bay of Islands to Bonne Bay: limestone cliffs and talus, Tucker's Head, *Fernald, Long & Fogg,* no. 1749.

D. rupestris R. Br. The southern known limits in Newfoundland are on Bonne Bay: limestone cliffs near Stanleyville, *Fernald, Long & Fogg,* no. 1727; shelves and talus of diorite cliffs, Western Head, no. 1728. Notre Dame Bay: turfy and rocky crests, Twillingate, *Fernald, Wiegand & Bartram,* no. 5459; exposed ledges, Castle Rocks, Tilt Cove, *Fernald, Wiegand & Darlington,* no. 5460.

Arabis alpina L. General in calcareous soils, either wet or moderately dry, south to Ingornachoix Bay. The typical plant has conspicuous milk-white petals with delicate and obscure veins. On Doctor Hill and about St. John Bay the petals are often firm, greenish-white and coarsely veined. This is

*A. alpina, forma **phyllopetala**, f. nov., petalis firmis viridiscentibus valde venosis.—Newfoundland: shaded shelves of limestone cliff, Crow's Head, St. John Bay, July 28, 1929, *Fernald, Long & Fogg,* no. 1753 (type in Gray Herb.); thickets on quartzite gravel along brook, Deep Gulch, Doctor Hill, August 7, 1929, no. 1754.

A. Drummondi Gray. Additional station on Bonne Bay: turfy slopes below limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg,* no. 1756.

In view of the occurrence of *Arabis Drummondi* in New England at low altitudes it is a striking fact that in western Newfoundland it is known only on the high limestone escarpments and crests of the Highlands of St. John and of Killdevil.

*Drosera obovata Mert. & Koch. Bonne Bay: with *D. anglica,*

ARENARIA NORVEGICA: FIG. 1, plant, × 1, from Torne Lappmark; FIG. 2, seeds, × 10, from Norway.

A. CYLINDROCARPA: FIG. 3, fragments, in young fruit, × 1, from Newfoundland; FIG. 4, flower, × 6, from Quebec; FIG. 5, mature fruit, × 6, from Newfoundland; FIG. 6, seeds, × 10, from Newfoundland.

CERASTIUM TERRAE-NOVAE: FIG. 1, small plants, × 1, from Bonne Bay, Newfoundland; FIG. 2, seeds, one showing ruptured testa, × 10, from the TYPE, Blomidon, Newfoundland.

intermedia and *rotundifolia* in peaty borders of ponds in the barrens at about 365 m., Lookout Mt., *Fernald, Long & Fogg*, no. 1759; with the same associates, often forming pure colonies of considerable extent, wet peaty bog-barrens at 400–550 m. alt., tableland of Lookout Mt., no. 1760.

The first record, apparently, for North America. *D. obovata* is usually considered a hybrid of *D. anglica* and *D. rotundifolia*. The Lookout Mt. plant is abundant in spots, sometimes more so than its associates. See p. 87.

D. LINEARIS Goldie. To the single known Newfoundland station (on Blomidon, Bay of Islands) should be added the following extensive one. POINTE RICHE: quagmire-margin of pool in limestone barrens, *Fernald, Long & Fogg*, no. 1761, the plant making essentially continuous turf about a single pool, hundreds of other neighboring and apparently similar pools quite lacking it.

*SARRACENIA PURPUREA L., forma HETEROPHYLLA (Eaton) Fern. RHODORA, XXVI. 174 (1922). BONNE BAY: open upland marsh, *Harlow Bishop*, no. 336; open savannah near mouth of Main River, *Fernald, Long & Fogg*, no. 1762, all the pale form, no purple flowers seen.

?*SAXIFRAGA ADSCENDENS L.

In the Roemer herbarium at the British Museum, received through Shuttleworth, there is a specimen of characteristic *Saxifraga adscendens* (the identification confirmed for me by Mr. A. J. Wilmott) originally labeled: "*Saxifraga tricuspidata*," with the pencilled data: "Grönlandia, Terra nova," and the pencilled name of the author (of *S. tricuspidata*) "Rottb." Shuttleworth has added: "vix Rottb. an *petraea* vel *adscendens* Vahl" and "Herb. Roem." *Saxifraga tricuspidata* is, of course, a characteristic plant of Greenland and northern Labrador (not yet definitely known from Newfoundland) and the specimen of *S. adscendens* from "Grönlandia, Terra nova" may have accidentally replaced one of *S. tricuspidata*. On the other hand, *S. adscendens* is a western European plant which might well be in Newfoundland;[1] *S. adscendens* is, likewise, found in cordilleran North America, consequently, since hundreds of other cordilleran species are isolated in Newfoundland, it is to be expected in the latter region.

*PARNASSIA CAROLINIANA Michx. ST. JOHN BAY: wet bog back of Eddy's (Old Man's) Cove, *Fernald, Long & Fogg*, no. 1778; wet boggy margin of pond, Back (or Bustard) Cove, no. 1779. BONNE BAY: alluvial islands and shores at mouth of Main River, no. 1780.

An attractive but long expected addition to the flora of western

[1] See Fernald, RHODORA, XXVIII. 50 (1926) and Proc. Intern. Congr. Pl. Sci. ii. 1501–1506 (1929).

Newfoundland, since it was known eastward to the tip of the Gaspé Peninsula and to Anticosti and the Mingan Islands.

Ribes hirtellum Michx., var. saxosum (Hook.) Fern. Rhodora, xiii. 76 (1911). A rather striking extreme, with leaves of the fertile branches rounded to cordate at base. Probably somewhat general on the West Coast. The following collections are at hand. Pointe Riche: bushy talus of limestone sea-cliffs at base of the Point, *Fernald, Long & Fogg*, no. 1782. Bay of Islands: wet woods, Crabb's, June 12, 1896, *Waghorne*.

Amelanchier Fernaldii Wiegand, Rhodora, xxii. 149 (1920). Range extended north to St. John Bay: peaty thicket bordering limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 1792; shrubs 0.5–1 m. high. See p. 56.

A. laevis Wiegand, Rhodora, xiv. 154, t. 96, fig. 7 (1912). Range on the West Coast extended north to Bonne Bay: talus of limestone cliff opposite Lomond, *Fernald, Long & Fogg*, no. 1791.

Crataegus laurentiana Sarg. Very rare and local; the following are the known stations. Valley of the Exploits: sandstone ridges and banks, Rushy Pond, and ledges and gravel by the river, Bishop Falls, *Fernald, Wiegand & Darlington*, nos. 5642, 6606. Bay of Islands: brought from wild thicket at Hugh's Brook to garden of James Pennell, Esq. at Curling, *Fernald, Long & Fogg*, no. 1794. See p. 49.

*Potentilla sterilis (L.) Garcke (*P. Fragariastrum* Ehrh.). Avalon Peninsula: exact locality not definitely known, 1928, *A. M. Ayre*.

Potentilla sterilis is a noteworthy addition to the flora of North America. Unfortunately, Mrs. Ayre, in collecting it, was not fully aware of the significance of the discovery and there is some question as to the exact source of the specimens. In the winter of 1930–31, while going over with Mrs. Ayre a large collection of the very variable *Fragaria virginiana* marked "Strawberries near Murray's Pond, all wild," I found in the series two individuals (now in the Gray Herbarium) of most characteristic *Potentilla sterilis*. Mrs. Ayre had drawn a similar plant, probably from cliffs at Brigus. Subsequent search has, thus far, failed to rediscover the exact spots whence the collections came. *P. sterilis* is a typical plant of central, western and southern Europe; and its discovery in Newfoundland adds another to the long series of western Eurasian types which are apparently also indigenous there.

P. pectinata Raf. To the very few Newfoundland stations add Bay of Islands: crests of sandstone sea-cliffs, Woody Island, *Fernald, Long & Fogg*, no. 299. See p. 9.

P. norvegica L., var. labradorica (Lehm.) Fern. Rhodora,

xxviii. 213 (1926). Range extended from the Straits of Belle Isle south to Bonne Bay: shaded limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1801. See p. 89.

*P. erecta (L.) Hampe (*P. Tormentilla* Neck.). Avalon Peninsula: a large patch in moss, Quidi Vidi, August 26, 1930, July, 1931, *A. M. Ayre*.

Potentilla erecta, more familiarly known in Europe as *P. Tormentilla*, is as significant an addition to the indigenous flora of southeastern Newfoundland as *P. sterilis* (see above) or as were some other typical western Eurasian species now long known from the Avalon Peninsula: *Potamogeton polygonifolius* Pourret, *Festuca capillata* Lam., *Glyceria fluitans* (L.) R. Br., *Nardus stricta* L., *Juncus bulbosus* L., *Montia rivularis* C. C. Gmel., *Ranunculus hederaceus* L., *R. Flammula* L., *Potentilla procumbens* Sibth., *Pedicularis sylvatica* L., etc.

*P. Anserina L., forma **sericea** (Hayne), comb. nov. *P. Anserina*, var. *sericea* Hayne, Arzneigew. iv. 31 (1816). *P. Anserina*, β. *concolor* Wallr. Sched. Crit. i. 226 (1822). *P. Anserina*, β. *holosericea* Gaud. Fl. Helv. iii. 405 (1828). *P. Anserina*, α. *argentea* Neilr. Fl. Nied. Österr. 909 (1859). *P. Anserina* α. *unicolor* Schur, Enum. Pl. Transs. 189 (1866). *P. sericea* (Hayne) Zimmeter, Eur. Art. Gatt. Pot. 6 (1884), not L. *P. concolor* (Wallr.) Zimmeter, Bot. Kal. 1887: 66 (1887). *Argentina Anserina concolor* (Wallr.) Rydb. Mon. N. Am. Pot. 160 (1898). *A. argentea* Rydb. Bull. Torr. Bot. Cl. xxxiii. 143 (1906). *A. Anserina sericea* (Hayne) Piper, in Piper & Beattie, Fl. Se. Wash. 142 (1914). *P. Anserina*, var. *argentea* (Rydb.) Jepson, Man. Fl. Pl. Calif. 485 (1925), not Neilr. (1859) as to type.—Bay of Islands: upper border of gravelly sea-beach, Governor Island, *Fernald, Long & Fogg*, no. 300.

In Newfoundland, eastern Canada and northern New England *Potentilla Anserina* (var. *vulgaris* Hayne), with the upper leaf-surfaces deep-green, passes as it gets into drier habitats (like the upper borders of beaches) by a perfect transition into the very striking extreme with the upper surfaces silvery-sericeous. The latter extreme is at best a mere form, certainly not a true variety. It is quite parallel with *P. palustris*, f. *subsericea* (Becker) Wolf. Although Rydberg set up his *Argentina argentea* as an American species quite apart from the Old World *P. Anserina* var. *argentea* Neilr., I am quite incapable of finding the differences. Several Eurasian collections seem to me inseparable from the American plants.

Dryas integrifolia Vahl, forma **canescens** (Simmons), comb. nov. *D. integrifolia*, var. *canescens* Simmons, Vasc. Pl. Fl. Ellesmereland, 46 (1906).—The Newfoundland stations are Pointe Riche: scarce (and sterile), on peaty and turfy limestone barrens, with the abundant and typical form with green upper surfaces of the leaves,

Fernald, Long & Fogg, no. 1812. Port au Port Bay: dry exposed ledges and shingle on the limestone tableland, alt. 200–300 m., Table Mt., *Fernald, Wiegand & Kittredge,* no. 3598, *Fernald & St. John,* no. 10,846, *Mackenzie & Griscom,* no. 10,317. Cape St. George: dry limestone barrens, local, Green Gardens, *Mackenzie & Griscom,* no. 11,078.

Dryas integrifolia, f. *canescens* is quite parallel with *Potentilla Anserina,* f. *sericea, P. palustris,* f. *subsericea,* and numerous other cases. It is likely to be found in the most arid situations throughout the range of *D. integrifolia.* Abundant collections from Greenland indicate that such is the case there, just as it is in western Newfoundland.

Alchemilla vulgaris L., var. vestita (Buser) Fern. & Wiegand, Rhodora, xiv. 233 (1912). *A. minor* Huds. Extended south on the West Coast to Bonne Bay: damp thickets under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg,* no. 1821.

On the mountains of western Newfoundland *Alchemilla vulgaris,* var. *vestita* and var. *filicaulis* (Buser) Fern. & Wieg. are both conservative and rather localized plants of remote subalpine habitats. Nevertheless, at some places on the island they are both inclined to become aggressive weeds. Mrs. Ayre sends var. *vestita* from St. John's, where it is a "terrible weed" in lawns, etc., just as typical *A. vulgaris* has become an almost indestructible pest in western Nova Scotia.

Prunus virginiana L. The Choke Cherry extends north on the West Coast to Bonne Bay: swales and margins of wet thickets along Winterhouse Brook, *Fernald, Long & Fogg,* no. 1825.

Astragalus eucosmus Robinson. Our first station on the West Coast south of Pistolet Bay is on Bay of Islands: turfy spots on slaty calcareous talus, Cutwater Head, *Fernald, Long & Fogg,* no. 1827. See p. 50.

Oxytropis foliolosa Hook. The first station on the West Coast south of Pistolet Bay is on Bay of Islands: turfy spots on slaty calcareous talus, Cutwater Head, *Fernald, Long & Fogg,* no. 1828. See p. 50 and map 3.

It will be noted that neither *Oxytropis foliolosa* nor *Astragalus eucosmus* have been found on the West Coast of Newfoundland between Pistolet Bay and the Middle Arm of Bay of Islands. In describing our very hurried and wholly superficial botanizing on Cutwater Head (p. 50), I noted the occurrence there of a new *Taraxacum* with extraordinarily large heads, a plant collected also in evening light of the same day on the cliff at neighboring Cod Cove. This *Taraxacum* (to be described and illustrated in Part III), like the *Astragalus* and the *Oxytropis,* is likewise known in western Newfoundland only

Lesquerella arctica: fig. 1, small plant, × 1, from Greenland; fig. 2, fruit, × 1, from Greenland; fig. 3, shriveled flower, showing lance-acuminate sepals, × 4. from Greenland.

L. Purshii: fig. 4, small plant, × 1, from Newfoundland; fig. 5, fruit, × 1, from Newfoundland; fig. 6, flower, showing oblong, obtuse sepals, × 4, from Newfoundland.

on Pistolet Bay and the Middle Arm of Bay of Islands. Whatever the peculiar factors, as yet not wholly apparent (probably similarity of rock), which concentrate at points 200 miles apart these highly localized species, it is probable that, if our incidental five-minute landing on Cutwater Head had been extended to half-a-day, many other specialties of Pistolet Bay might have been found: such plants as *Carex capitata* L., *Cerastium Regelii* Ostenf., *Ranunculus pedatifidus* J. E. Sm., var. *leiocarpus* (Trautv.) Fern., *Draba nivalis* Lilj., *Parnassia Kotzebuei* C. & S., *Potentilla usticapensis* Fern., *Astragalus stragulus* Fern., *Arctostaphylos rubra* (Rehder & Wilson) Fern., *Bartsia alpina* L., *Antennaria eucosma* Fern. & Wieg., *A. vexillifera* Fern., *Arnica plantaginea* Pursh and *Crepis nana* Richardson. Here is a real challenge and an opportunity for a worth-while vacation for a pair of intelligent cliff-climbers.

OXYTROPIS JOHANNENSIS Fern. RHODORA, XXX. 145, t. 173 (1928). To the few Newfoundland stations already recorded add BONNE BAY: limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1831.

O. TERRAE-NOVAE Fern. l. c. 147, t. 174 (1928).

Apparently somewhat general on dry calcareous shingle and exposed limy ledges from the eastern entrance of Hudson Strait to southwestern Newfoundland (MAP 22). This type of distribution is shown by *Arnica terrae-novae* and *A. plantaginea* (to be considered later) and several other species.

MAP 22. Range of OXYTROPIS TERRAE-NOVAE.

HEDYSARUM ALPINUM L. Our only stations (as yet) between Cow Head and the limestone barrens of Port au Port Bay are on Bonne Bay and Bay of Islands. BONNE BAY: limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1835; basaltic talus near mouth of Wallace's Brook south of Bonne Bay, no. 1834. See p. 94. BAY OF ISLANDS: turfy spot on slaty calcareous talus, Cutwater Head, no. 1832. See p. 50.

*H. ALPINUM L., var. AMERICANUM Michx., forma **albiflorum** (Standley), comb. nov. *H. americanum* (Michx.) Britton, f. *albiflorum* Standley, Field Mus. Pub. Bot. viii. 15 (1930).—The only Newfound-

land collection of the albino is from Valley of the Exploits: ledges and talus, north bank of the river below the falls, Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, no. 5801.

*Vicia Cracca L., var. sericea Peterm. This very striking silvery-sericeous extreme was found on Bonne Bay: gravelly beach near old lumber camp (obviously introduced), Beachy Cove, *Fernald, Long & Fogg*, no. 1837.

Lathyrus japonicus Willd., var. aleuticus (Greene) Fern. Rhodora, xxxiv. 179 (1932). Extending locally south to Notre Dame Bay and to Port au Port Bay. Frequently producing cleistogamous flowers and reniform fruits, resembling those of *Amphicarpa bracteata*.[1]

[1] Amphicarpa **bracteata** (L.), comb. nov. *Glycine bracteata* L. Sp. Pl. ii. 754 (1753). *G. monoica* L. Sp. Pl. ed. 2, ii. 1023 (1763). *A. monoica* (L.) Ell. Journ. Acad. Phil. i. 373 (1818). *Falcata comosa* Britt. in Britt. & Br. Ill. Fl. ii. 334, fig. 2225 (1897), not *Glycine comosa* L. Sp. Pl. ii. 754 (1753).

In eastern North America we have two well marked species of *Amphicarpa:* (1) the very common plant with filiform stems, slight or short pubescence and few whitish to pale-lilac petaliferous flowers, the plant called for many years *A. monoica* (L.) Ell. (1818) and described and illustrated in Britton & Brown as *Falcata comosa* (L.) Kuntze (1891); and (2) the much coarser villous plant with longer pubescence and the deeper purple flowers more numerous. This plant, no. 2, is *A. Pitcheri* T. & G. (1838).

Although by Britton & Brown *Falcata comosa* (L.) Kuntze, based on *Glycine comosa* L. (1753), is made to include as a synonym *Amphicarpa monoica* (L.) Ell., based on *Glycine monoica* L. (1763), while *Falcata Pitcheri* (T. & G.) Kuntze is maintained as a separate species, it is to be noted that in 1753 Linnaeus clearly recognized the two American species, basing them both on characteristic specimens of Clayton's and on clear diagnoses by Gronovius. Both the Linnean species were on the same page (754) of Species Plantarum (1753): (1) *Glycine comosa*, with the original Linnean diagnosis "GLYCINE foliis ternatis hirsutis, racemis lateralibus" and (2) *G. bracteata* with the original Linnean diagnosis "GLYCINE foliis ternatis nudiusculis, caule piloso, racemis pendulis, bracteis ovatis." Both go back directly to the fuller accounts of Gronovius and, therefore, the Clayton specimens (no. 182 as type of *G. comosa*, no. 592 as type of *G. bracteata*) which formed the bases of the Gronovian and, following him, the Linnean descriptions; and both came from "Virginiae *madidis umbrosis*," the habitats given by Clayton and Gronovius. In case of *G. comosa* Linnaeus, following Gronovius, cited also the *Phaseolus marianus scandens* of Petiver, which is now unidentifiable but presumably correctly placed with Clayton, no. 182.

Since the Gronovian descriptions upon which Linnaeus based his two species, *Glycine comosa* and *G. bracteata*, so well differentiate our two species and since Linnaeus would presumably not have divided into two species the more slender plant, as has been generally assumed, it seemed desirable to study the types in connection with a series of typical American plants In the summer of 1930 Mr. Bayard Long and I made such a study at the British Museum. The type of *Glycine comosa* is beautifully characteristic *Amphicarpa Pitcheri*, so well defined by Gronovius: "late scandens, floribus coeruleis in racemos parvos ad genicula congestis, foliis hirsutis." Consequently, A. Pitcheri T. & G. *should be called* A. comosa (L.) G. Don in Loud. Hort. Brit. 314 (1830).

Glycine bracteata L. (1753) was renamed by Linnaeus in 1763 *G. monoica*, because he thought this new name more descriptive of a plant notable for its two types of flowers and fruits; and by the old Kew Rule the correct name (the first combination of generic and specific names) was *Amphicarpa monoica* (L.) Ell. The type of *G. bracteata*, therefore of *G. monoica*, is clearly the slender plant long called *Amphicarpa monoica* and well defined by Linnaeus (following Gronovius) with "foliis . . . nudiusculis . . . *Alae & Carina albae, Vexillo pallide violaceo.*" Consequently, as indicated in the opening paragraph, Amphicarpa monoica (L.) Ell. must be called A. bracteata (L.), comb. nov.

L. JAPONICUS Willd., var. GLABER (Ser.) Fern. l. c. 181 (1932). Extending northward on the West Coast to Cow Head.

*L. JAPONICUS Willd., var. GLABER, f. ACUTIFOLIUS (Bab.) Fern. l. c. 182 (1932). The only American collection seen is from BONNE BAY: upper border of beach, White Point, *Fernald, Long & Fogg*, no. 1840.

L. JAPONICUS Willd., var. PELLITUS Fern. l. c. 183 (1932). Extending north to Notre Dame Bay and to St. John Bay.

*L. PRATENSIS L. LOWER HUMBER VALLEY: springy glades in spruce woods between Marble Mountain and Humbermouth, *Fernald, Long & Fogg*, no. 1844.

As stated on p. 15, *Lathyrus pratensis* in the mossy glades in typical spruce forest of the Lower Humber has every appearance of a native plant. It has as associates or near neighbors in the natural glades and woodlands other European species (*Cardamine flexuosa* With., *Linum catharticum* L., *Scrophularia nodosa* L. and *Cirsium palustre* (L.) Scop.) which, likewise, have every aspect of indigenous species. With them are the usual circumpolar or amphigean species of the Canadian forest-flora (*Thelypteris Dryopteris* (L.) Slosson and *T. Phegopteris* (L.) Slosson, *Botrychium virginianum* var. *europaeum* Ångstr., *Cinna latifolia* (Trev.) Griseb., *Carex capillaris* L. and *lepidocarpa* Tausch, *Streptopus amplexifolius* (L.) DC., *Caltha palustris* L., *Pyrola minor* L., etc.), as well as the usual endemic American species of wet calcareous woods (*Cystopteris bulbifera* (L.) Bernh., *Taxus canadensis* Marsh., *Carex stipata* Muhl., *Habenaria dilatata* (Pursh) Gray, *Listera convallarioides* (Sw.) Nutt., etc., etc.). These are not weeds and our conviction was, that *Lathyrus pratensis* and its other European associates are as definitely indigenous in western Newfoundland as are the endemic American species with which they are found.

In this connection it is worth while to record some other stations for *Lathyrus pratensis*. ON PRINCE EDWARD ISLAND: springy meadow, Rocky Point, Queens Co., *Fernald & St. John*, no. 7709. In NOVA SCOTIA: border of boggy swale, Springhill Junction, *Pease & Long*, no. 21,732. Although an occasional introduction along railroads and roadsides on the continent of North America, *L. pratensis* may prove to be quite as indigenous in Prince Edward Island and Nova Scotia as in Newfoundland.

LINUM CATHARTHICUM L. Known in Newfoundland from the LOWER HUMBER VALLEY: wet slaty border of ditch, near Humbermouth, July 4, 1910, *Fernald, Wiegand & Kittredge*, no. 3654; railway gravel near Humbermouth, July 18, 1910, no. 3655; wet springy banks and thickets, Humbermouth, *Fernald, Long & Fogg*, no. 1845; dry humus over limestone ledges and shingle, Hannah's Head, no. 1846;

damp limestone gravel between Marble Mt. and Humbermouth, *Fernald & Long*, no. 1847.

See discussion on p. 15 and under *Lathyrus pratensis* (preceding). Although Wiegand and I, in 1910, took *Linum catharticum* to be a railroad introduction, it has not spread in 20 years as a railroad weed. It is quite possible that the railroad merely invaded its natural area.

*Empetrum nigrum L. f. purpureum (Raf.) Fern. Rhodora, xxv. 83 (1923). Bonne Bay: abundant with the common black-fruited form, peaty and turfy upper quartzite slopes (alt. 600–650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1851. See p. 89.

The combination *Empetrum nigrum*, f. *purpureum* was independently made by R. Good, Trans. Linn. Soc. xlvii. 519 (1927), Good obviously overlooking its publication in 1923.

Elatine minima (Nutt.) Fisch. & Meyer. See Fernald, Rhodora, xix. 13 (1917). To the two recorded stations in Newfoundland add from District of Burgeo and La Poile: sandy and gravelly margin of pond, Burgeo, *Fernald, Long & Fogg*, no. 326. See p. 13.

Viola palustris L. To the stations on the Straits of Belle Isle add from Highlands of St. John: springy meadow on quartzite slope near head of Yellow Brook, and slopes, ledges and gravel near head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1862–1864. See p. 58.

*Epilobium angustifolium L., var. macrophyllum (Hausskn.) Fern. Rhodora, xx. 4 (1918). Highlands of St. John: wet quartzite ledges and gravel along brook, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1872.

The only other known stations in eastern North America are on the Magdalen Islands. See p. 58.

E. Pylaieanum Fern. Rhodora, xxvii. 33 (1925). To the four stations originally recorded add the following. District of Burgeo and La Poile: wet moss and peat on gneiss hills, Sand Bank and Burgeo, *Fernald, Long & Fogg*, nos. 331, 332. See p. 12.

In view of the difficulty of the genus *Epilobium* and the seeming restriction of *E. Pylaiaeanum* to southernmost Newfoundland, it seems desirable to illustrate it. Plate 259 shows well-developed plants, life-size, and characteristic calyx, × 6, and seed, × 10.

E. wyomingense Nelson. To the few recorded Newfoundland stations add from Bay St. John: wet bog back of Eddy's (Old Man's) Cove, *Fernald, Long & Fogg*, no. 1873.

E. davuricum Fisch. To the few recorded stations add the following: St. John Bay and Ingornachoix Bay: damp open depressions in limestone barrens, Eastern Point and bare wet peaty depressions, Pointe Riche, *Fernald, Long & Fogg*, nos. 1877, 1878.

E. boreale Hausskn. Newfoundland range extended south to

EPILOBIUM PYLAIEANUM: FIGS. 1, 2 and 3, fruiting and flowering plants, × 1, from Burgeo, Newfoundland; FIG. 4, flower, showing oblong, obtuse calyx-lobes, × 6, from Burgeo; FIG. 5, seed, showing slender beak, × 10, from the TYPE, Port aux Basques, Newfoundland.

Bonne Bay: damp thicket under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1881.

E. lactiflorum Hausskn. To the stations already recorded add the following. Highlands of St. John: wet quartzite ledges and gravel along brook, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1882. Bonne Bay: damp thicket under limestone crests (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1884.

Oenothera perennis L. The northern limit in western Newfoundland seems to be on Bonne Bay: scarce, along trail in spruce woods and thickets, slope of Lookout Mt., *Fernald, Long & Fogg*, no. 1887.

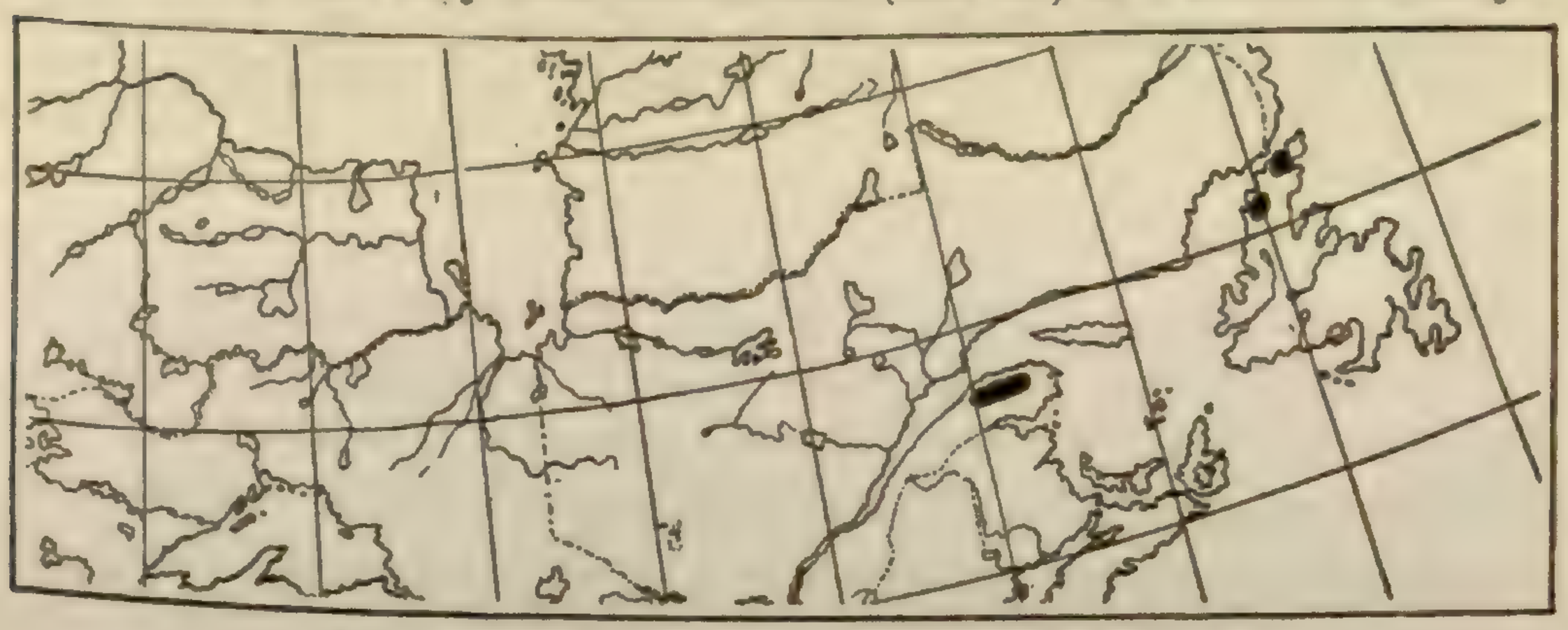
Conioselinum pumilum Rose. In Newfoundland apparently confined to the serpentines of the West Coast and to the north side of Notre Dame Bay. Notre Dame Bay: boggy places on hill southwest of Tilt Cove and border of Castle Pond, Tilt Cove, *Fernald, Wiegand & Darlington*, nos. 5961, 5962. Bonne Bay: serpentine tablelands, alt. about 380 m., *Fernald, Wiegand & Kittredge*, no. 3788; damp humus on serpentine gravel, slopes (above 300 m.) and summit (alt. 710 m.), The Tableland, *Fernald, Long & Fogg*, no. 1895. Bay of Islands: wet depressions and borders of rills, slopes and crests of serpentine ridge, North Arm, *Long & Fogg*, no. 347; serpentine tableland, alt. 550 m. and slopes, Blomidon, *Fernald & Wiegand*, nos. 3785–3787. See pp. 10, 83.

Angelica laurentiana Fern. Rhodora, xxviii. 222 (1926). Abundant at low altitudes about St. John Bay: very abundant (dominant) on Grassy Island, *Fernald, Long & Fogg*, no. 1899, and on Savage's Island, and frequent in clearings about Old Port au Choix. See p. 60.

Phyllodoce caerulea (L.) Bab. To the very few known Newfoundland stations add the following. Highlands of St. John: peat on quartzite slopes, head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1917. Bonne Bay: peaty and turfy upper quartzite slopes (alt. 600–650 m.) Killdevil, *Fernald, Long & Fogg*, no. 1918.

Vaccinium nubigenum Fernald, Rhodora, x. 53 (1908). Plate 260. To the recorded stations add the following from Highlands of St. John: peaty quartzite slopes, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1936, 1937. See p. 58.

In view of the very local occurrence (map 23) of *Vaccinium nubige-*



Map 23. Range of Vaccinium nubigenum.

num it is desirable to show its habit. Anthers of the two related species (*V. cespitosum* Michx. and *V. ovalifolium* Sm.) are shown for comparison. As stated on p. 58, *V. ovalifolium* in eastern America is always past anthesis when *V. nubigenum* (likewise *V. cespitosum*) is coming into bloom.

Primula egaliksensis Wormsk. Extended slightly southward to Ingornachoix Bay: turfy borders of limestone beach and dry gravelly limestone barrens, Gargamelle Cove, *Fernald, Long & Fogg,* nos. 1952, 1953 (the latter exceptional in growing in *dry* gravel, consequently with scarcely developed scapes).

*Androsace septentrionalis L. Bonne Bay: limestone talus, Tucker's Head, *Fernald, Long & Fogg,* no. 1954. See pp. 81, 96 and map 5.

Only two plants were found, one in fruit, the other a sterile rosette. These, presumably, were chance survivors of a colony which had become much depleted through failure to fruit during a series of adversely cold summers (see pp. 4, 95–97). The map has a single station in northwestern Greenland. So far as I can find, *Androsace septentrionalis* has never been recorded from Greenland. It and some other plants, not yet listed from Greenland, were collected on the Crockerland Expedition by Dr. Ekblaw. The sheet in the Gray Herbarium bears the data: dry warm gravel slope, Etah, July 15, 1915, *W. Elmer Ekblaw.* Dr. Ekblaw collected abundant material, but his Etah station and several from adjacent northeastern Ellesmereland are the only ones yet known in eastern Arctic America.

Lysimachia terrestris (L.) BSP. Range in western Newfoundland extended north to Bonne Bay: gravel along Deer Brook, *Fernald, Long & Fogg,* no. 1955.

At this northern outpost of the species the plants, in late August, were all sterile and only 1–2 dm. high.

Fraxinus nigra Marsh. Range on the West Coast extended north to Bonne Bay: talus of limestone cliff opposite Lomond, *Fernald, Long & Fogg,* no. 1958.

Bartonia paniculata (Michx.) Muhl., var. iodandra (Rob.) Fern. Rhodora, xxiii. 228 (1922). Range on the West Coast extended north to Bonne Bay: wet peaty barrens at about 365 m., Lookout Mt., *Fernald, Long & Fogg,* no. 1962.

The migration of *Bartonia paniculata* (extending southward along the Coastal Plain to Louisiana) between New Jersey and Newfoundland, or *vice versa,* is well brought out by the map of its range northeast of New Jersey (map 24). The Newfoundland plant is all var. *iodandra.*

Myosotis laxa Lehm. Range in western Newfoundland extended

MAP. 24. Northeastern Range of BARTONIA PANICULATA (including Varieties).

north to Bonne Bay: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1965.

Prunella vulgaris L., var. lanceolata (Bart.) Fern. Rhodora, xv. 183 (1913). Range extended north to Bonne Bay: spruce woods and thickets, slope of Lookout Mt., *Fernald, Long & Fogg*, no. 1968 (pilose form); talus of limestone cliff opposite Lomond, no. 1969 (glabrescent form).

Lycopus uniflorus Michx. The northern known limits in Newfoundland are on Notre Dame Bay, East Branch of the Humber and Bonne Bay. Notre Dame Bay: Barred Islands, August 28, 1903, *Sornborger*. Bonne Bay: springy meadow, Woody Point, *Fernald, Long & Fogg*, no. 1973.

Scrophularia nodosa L. Rather general on calcareous slopes and in thickets and borders of woods on the Lower Humber and Humber Arm of Bay of Islands: wet place, Meadows, July 4, 1895, *Waghorne;* rocky bank, in open place just above tidewater, Bay of Islands (Humbermouth), 1908, *Eames & Godfrey*. no. 8051; rich woods, Wild Cove, 1910, *Fernald & Wiegand*, no. 3940; abundant in gravelly thicket, river-bank between Mt. Musgrave and Humbermouth, 1910, *Fernald & Wiegand*, no. 3939; crevices of dry limestone ledges, Hannah's Head, 1929, *Fernald, Long & Fogg*, nos. 1977, 1978. Also Avalon Peninsula: rocky places, Beachy Cove and Murray's Pond, *A. M. Ayre*.

Scrophularia nodosa (see p. 16), apparently inseparable from the European plant, is certainly indigenous along the lower Humber and about Humber Arm. It is a characteristic species of thickets, borders of woods and rocky slopes, just as are its endemic North American counterparts on the continent. Mrs. Ayre's discovery of the plant in rocky places on the Avalon Peninsula suggests that it may be looked for in many parts of the Island.

Mimulus moschatus Dougl. Range in western Newfoundland extended north to Bonne Bay: springy ditch, Shoal Brook, *Fernald, Long & Fogg*, no. 1980.

*Veronica officinalis L., var. Tournefortii (Vill.) Reichenb.

This very definite small extreme of *Veronica officinalis* is characterized by leaves only 1–3 cm. long and 4–17 mm. wide; by filiform peduncles much longer than their subtending leaves; by linear-cylindric, very lax and flexuous racemes; by blue-violet corollas with oblong or narrowly elliptic lobes and by capsules as broad as or broader than long. It abounds in coniferous woods and thickets, on peaty knolls and in sphagnous bogs in southeastern Newfoundland, is less common in western Newfoundland, and is frequent on Prince Edward Island and Cape Breton, often to the exclusion of the coarser plant which, following Reichenbach, I am treating as typical *V. officinalis:* the plant with coarser leaves, stouter and mostly shorter

VACCINIUM NUBIGENUM: FIG. 1, flowering branch, × 1, from Newfoundland; FIG. 2, margin of leaf, × 4; FIG. 3, flower, × 4; FIG. 4, anthers, × 8.
V. CESPITOSUM: FIG. 5, anthers, × 8, from Newfoundland.
V. OVALIFOLIUM: FIG. 6, anthers, × 8, from Oregon.

peduncles, denser racemes, lilac-blue or lavender corollas with broader lobes, and capsules about as broad as long.

The American specimens of var. TOURNEFORTII examined by me are the following. NEWFOUNDLAND: roadside, St. John's, July 31, 1894 ("exposed form"), *Robinson & Schrenk;* woods, St. John's, August 4, 1894 ("shaded form"), *Robinson & Schrenk;* covering knolls in dry spruce woods, St. John's, *Fernald & Wiegand,* no. 6147; damp mossy or turfy hollows on hill south of St. John's, *Fernald & Wiegand,* no. 6148; dry banks, St. John's, *Fernald & Wiegand,* no. 6149; boggy places along Waterford R., between Waterford Bridge and St. John's, *Fernald & Wiegand,* no. 6150; border of damp spruce thicket on South Hill, *Fernald, Long & Dunbar,* no. 27,015; rocky slopes of Joan Plain's Hill, Bay Bulls, *Fernald, Long & Dunbar,* no. 27,016; Salmonier, August, 1885, *Roland Thaxter,* 1928, *A. M. Ayre;* rocky places, Murray's Pond, 1928, *A. M. Ayre;* moist woods near Topsail, *Howe & Lang,* no. 1224; gravelly thicket, Killigrew's, *Fernald & Wiegand,* no. 6151; damp gravelly slopes near Goose Pond, Whitbourne, *Fernald, Long & Dunbar,* no. 27,017; woods and thickets on slaty brookside, Curling, *Fernald, Long & Fogg,* no. 1984. PRINCE EDWARD ISLAND: grassy border of woods, Charlottetown, *Fernald & St. John,* no. 8008; dry woods, Rocky Point, *Fernald, Long & St. John,* no. 8009; dry woods and recent clearings, St. Dunstan's, *Fernald & St. John,* no. 11,178. NOVA SCOTIA: Louisburg, *J. Macoun,* no. 19,979.

(To be continued)

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. FERNALD

(*Continued from page 283*)

EUPHRASIA. Since the revision of *The Genus Euphrasia in North America*, RHODORA, xvii. 181–201 (1915)—Contrib. Gray Herb. no. xliv.—by Fernald & Wiegand, much material has been collected in Newfoundland and eastern Canada and a few collections have been made in Labrador. In so far as the recent collections amplify our understanding of the species and their ranges they are here recorded, following the sequence of the paper above referred to.

*EUPHRASIA OAKESII Wettst. In addition to the alpine stations already recorded the following should be listed. NEWFOUNDLAND: turfy barrens and slopes, Sacred Island, Straits of Belle Isle, *Wiegand, Gilbert & Hotchkiss*, no. 28,981. QUEBEC: in a single dryish turfy pocket, at 915–1100 m., southwestern slope of Mt. Fortin, Matane Co., *Fernald & Pease*, no. 25,269; mossy spots on calcareous sea-cliffs and rock-slides by Gulf of St. Lawrence, slightly west of Marten River, Gaspé Co., *Fernald & Pease*, no. 25,275.

The Quebec material is too young for positive identification but its foliage and pubescence are quite like those of typical *Euphrasia Oakesii*. The Mt. Fortin material comes from a turfy alpine habitat; the material from near Marten River, although from near sea-level, was associated with *Luzula spicata* (L.) DC., *Draba nivalis* Lilj., *Saxifraga cernua* L., *Potentilla nivea* L., *Androsace septentrionalis* L. and other arctic-alpine species. Most of the material from the Shickshock Mts., of Matane County, originally distributed as *E. Oakesii*, proves upon restudy to belong with *E. Williamsii*.

*E. WILLIAMSII Robinson. Straits of Belle Isle, NEWFOUNDLAND: turfy hillsides and barrens, western side of Quirpon Island, *Wiegand, Gilbert & Hotchkiss*, no. 28,973; in carpet of *Salix Uva-ursi* Pursh, open peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,974; dry gravelly and turfy limestone barrens, Savage Point, *Fernald & Long*, no. 28,976. Matane Co., QUEBEC (all distributed as *E. Oakesii*): wet calcareous cliffs and ledges, Nettle Gully, alt. about 400 m., northern base of Mt. Collins, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 26,001; talus of mica schist, chimney east of Razorback Ridge (alt. 850–1000 m.), Mt. Logan, *Pease & Smith*, no. 26,002; dry talus and ledges of green schists, at about 900–1125 m. alt., Hanging Valley, Mt. Pembroke, *Griscom & Pease*, no. 26,003; gravelly and turfy slides and chimneys at about 850–1000 m. alt., in the steep schistose southern face of Mt. Fortin, *Fernald &*

Smith, no. 26,004; shelves of cliffs and upper talus of green schists, alt. about 1100–1150 m., head of Hanging Valley, Mt. Pembroke, *Fernald & Smith*, no. 26,005.

E. WILLIAMSII, var. VESTITA Fern. & Wieg. Including *E. Oakesii*, forma *lilacina* Fern. & Wieg. Northern and western Newfoundland and adjacent Quebec Labrador; additional records follow. NEWFOUNDLAND: crests of dry trap cliffs and turfy headlands, Sacred Island, Straits of Belle Isle, *Wiegand, Gilbert & Hotchkiss*, nos. 28,975, 28,987; dry limestone gravel, Dog Peninsula, St. Margaret Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,989; turfy limestone crest, alt. 650 m., Killdevil, Bonne Bay, *Fernald, Long & Fogg*, no. 1999; dry upper diorite slopes and rock-crests at about 675–750 m. alt., Lookout Mt., Bonne Bay (type region), *Fernald, Long & Fogg*, nos. 1996, 1997; trap ledges and gravel, subalpine southern slope of Lark Mt., Bay of Islands, *Fernald, Long & Fogg*, no. 400. QUEBEC: calcareous sandstone cliffs of the upper terrace, Blanc Sablon (type region of *E. Oakesii*, forma *lilacina*), *Fernald, Wiegand & Long*, no. 2896. See pp. 6, 88.

Additional experience indicates that *Euphrasia Williamsii* var. *vestita* and *E. Oakesii*, forma *lilacina* are inseparable. The plant stands midway between typical *E. Williamsii* (with chocolate-brown to maroon corollas and glabrous leaves) and typical *E. Oakesii* (with the corolla white, with violet veins, and the leaves pilose-hirtellous). In var. *vestita* the color of the corolla varies ("purple, not chocolate" in no. 28,987; "crimson" in the type; "chocolate-brown to maroon" in no. 28,989; "chocolate-purple" in no. 400; "lilac" in type of *E. Oakesii* var. *vestita*). It may eventually seem wiser to treat the group as one species, *E. Oakesii*, with localized varieties differing in color of corolla and in pubescence, parallel with the variations of *E. purpurea*.

E. PURPUREA Reeks. Additional localities in NEWFOUNDLAND: turfy sandstone ledges, White Point, Bonne Bay, *Fernald, Long & Fogg*, no. 1990; brackish spot and gravelly beach, East Arm, Bonne Bay, *Fernald, Long & Fogg*, nos. 2,000, 2,001; knolls in sphagnous marsh, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg*, no. 402; turfy and gravelly talus of sandstone sea-cliffs, Woody Island, Bay of Islands, *Fernald, Long & Fogg*, nos. 403, 404 (very succulent); wet mossy barrens back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,043; sandy loam back of barrier-beach, Great Barachois (or Barasway Bay), Burgeo and La Poile, *Fernald, Long & Fogg*, no. 406.

*E. PURPUREA, forma CANDIDA Fern. & Wieg. Described from Magdalen Islands and from Saguenay Co., Quebec; clearly a white-flowered form of the glabrous *E. purpurea*. Now known from the Straits of Belle Isle, NEWFOUNDLAND: turfy upper border of limestone strand, Cape Norman, *Wiegand & Long*, no. 29,001; open peaty and

gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,977 (minutest of plants, fully mature and branching flowering specimens with leafy summit often only 3 mm. in diameter).

*E. PURPUREA, var. RANDII (Robinson) Fern. & Wieg. Typical var. *Randii*, with corollas purple and the faces of the green leaves sparsely crisp-pubescent, proves to be frequent on the coast of Newfoundland and to extend farther north on the Labrador than we knew in 1915. The new northern records follow. LABRADOR: fresh marsh, upland terrace, Indian Harbor, lat. 54° 25′, *Harlow Bishop*, no. 530. NEWFOUNDLAND: turfy and shingly limestone shore, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 27,063, *Fernald & Wiegand*, no. 29,013; turfy knolls near the hospital, Flower Cove, *Fernald*, no. 29,015; basaltic talus near mouth of Wallace's Brook (so. of Bonne Bay), *Fernald, Long & Fogg*, no. 1993; shelves and talus of diorite cliffs, Western Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1994; turfy crests of trap headlands, Lark Harbor, *Fernald, Long & Fogg*, no. 401; bare spots on peaty and gravelly slopes and peaty and gravelly thickets, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, nos. 407 (dense form in open habitat), 408 (lax shaded form); dry peaty barrens among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, nos. 27,048, 27,049; in turf on granite ledge, Gaultois, *Fernald, Long & Dunbar*, no. 27,045; granitic ledges, Ramea, *Fernald, Long & Dunbar*, no. 27,046; turfy sand plain back of the beach, Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 405; granite ledges and boulders by the sea, Burgeo, *Fernald, Long & Dunbar*, no. 27,047; damp depressions in sand and gravel back of barrier beach, Argentea, *Fernald, Long & Dunbar*, no. 27,044.

E. PURPUREA, var. RANDII, f. ALBIFLORA Fern. & Wieg. Reported from Newfoundland in 1915 only from the East Coast. Now known to be more general around the coast: dry gravel of limestone barrens, southern half of Burnt Cape, Pistolet Bay, *Fernald & Long*, no. 28,996; turfy or peaty pockets in limestone ledges, Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 27,036 (distributed as *E. Oakesii*); turfy and gravelly limestone strand, Yankee Point, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,982; peaty or turfy pockets in limestone barrens, Brig Bay, *Fernald, Long & Dunbar*, no. 27,040 (distributed as *E. Oakesii*); turfy limestone shore and damp peaty hollows in limestone barrens, Sandy Cove, Ingornachoix Bay, *Fernald, Long & Dunbar*, nos. 27,041, 27,042 (distributed as *E. Oakesii*); crests, crevices and talus of trap sea-cliffs, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 399; wet bog-barrens, Trepassey, *Fernald, Long & Dunbar*, no. 27,052.

On account of its extreme dwarfing much of the material was originally mistaken for *E. Oakesii*, but even the small plants (unless crowded) have a strong tendency to divergent basal branching, while the smaller-flowered *E. Oakesii* is almost uniformly simple, the

rare branching plants having few ascending branches chiefly from the median axils.

E. PURPUREA, var. FARLOWII (Robinson) Fern. & Wieg. Frequent near the coast; the following NEWFOUNDLAND records may be noted: turfy barren slopes, Sacred Island, *Wiegand, Gilbert & Hotchkiss*, no. 28,980; open peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,979; turfy and peaty spots (various stations, as *E. Oakesii*), Flower Cove, *Fernald, Long & Dunbar*, nos. 27,034, 27,035, 27,037, 27,038; turfy limestone shore, St. Barbe, *Fernald, Long & Dunbar*, no. 27,039, as *E. Oakesii;* dry limestone gravel, Dog Peninsula, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,983; headlands, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,124; dry peaty barrens among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,054; turfy pastures, Argentea, *Fernald, Long & Dunbar*, no. 27,053; wet bog-barrens, Trepassey, *Fernald, Long & Dunbar*, no. 27,052; peaty pockets in silicious rocks near crest of South Hill, St. John's, *Fernald, Long & Dunbar*, no. 27,051.

*E. PURPUREA, var. FARLOWII, f. IODANTHA Fern. & Wiegand. Originally from Matinicus Island, Maine, now known from several regions in NEWFOUNDLAND: turfy and gravelly limestone strand, Yankee Point, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,985; turfy limestone barren, Capstan Point, Flower Cove, *Fernald*, no. 28,984; turfy limestone barrens, Dog Peninsula, St. Margaret Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,988; dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port au Port, *Fernald & Wiegand*, nos. 3998 (individuals with glandular bracts), 4002 (bracts glandless); dry peaty crests of gneiss hills near Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 409.

E. DISJUNCTA Fern. & Wieg. The commonest species of Newfoundland with medium-sized whitish corolla, general in the northern, central and western regions, south to Notre Dame Bay, the Exploits Valley and the Cod Roy area.

E. ARCTICA Lange. Recorded from Newfoundland only from Table Mt., Port au Port Bay; common in northern Newfoundland: St. Anthony, September 10, 1923, *A. G. Huntsman;* Quirpon Harbor, September 8, 1923, *Huntsman;* slaty cliffs and talus, Cape Raven, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,000; upper border of limestone gravel-beach and turfy limestone barrens, Burnt Cape, Pistolet Bay, *Fernald & Long*, nos. 28,995, 28,997; turfy limestones barrens, Cape Norman, *Wiegand & Long*, no. 29,002; turfy limestone barrens, Yankee Point, Straits of Belle Isle, *Fernald, Wiegand & Long*, nos. 29,005–29,009; turfy limestone barren, Capstan Point, Flower Cove, *Fernald*, no. 29,004, *Fernald & Wiegand*, no. 29,012; springy cliffs and talus above the Overfall of Deer Pond Brook, Highlands of St. John, *Wiegand, Gilbert & Hotchkiss*, no. 29,017; dryish limestone

talus, western face of Doctor Hill, *Fernald & Long*, no. 29,020; turfy limestone strand, Bard Harbor, St. John Bay, *Wiegand & Gilbert*, no. 29,018 (gigantic, some plants nearly 6 dm. high, with bracts 2 cm. broad); turfy limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, nos. 28,992, 28,994, 29,026; turfy terraces and slopes on limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 1989.

As *Euphrasia arctica* I am treating the plant so common about the coast of the lower St. Lawrence in Quebec and in northwestern Newfoundland, thence north around the coast of Labrador to Hudson Bay; also on the coast of Greenland, on Iceland and the Faeröe Islands and somewhat general around the subarctic regions. Our plant is well matched by much Greenland material as well as specimens from Iceland and arctic Scandinavia, and it seems to be quite inseparable from the Greenland, Iceland and Faeröes plant so beautifully illustrated, as *E. officinalis*, var. *latifolia*, by Lange in Fl. Dan. xvii. fasc. xlix. 9, t. mmdccccx. (1877); the smaller and less pubescent plants from Labrador and Newfoundland so closely matching Lange's plate that the latter must have been made from very similar material. *E. arctica* was published in a list of plants of the Faeröes by Rostrup as

**E. arctica* Lge (in litt.). Denne forhen ubeskrevne, ret ejendommelige art eller underart er temmelig almindelig, den er også funden i Grønland og Island ifølge meddelelse af prof. Lange. Char.: Folia viscoso-puberula, reniformi- vel cordato-orbicularia, obtusissime crenata, margine revoluta; bracteae majusculae, sensim acutius crenatae v. serratae; flores subcapitato-congesti.[1]

Unfortunately, however, to work back to the beginning of a complicated question, Hooker, not at all understanding the genus *Euphrasia*, had enumerated from "Prairies of the Rocky Mountains," *Drummond*, a *E. officinalis*, "β. var. rotundifolia, laxiflora.—E. latifolia. *Ph. l. c.* (*non* L.)"[2] The Drummond plant, from the Rocky Mts. (*E. officinalis*, β. of Hook.), as shown by a good sheet of it in the Gray Herbarium, is *E. disjuncta* Fern. & Wieg. Whether or not it was like anything Pursh may have seen from Labrador, it is now impossible to say. Pursh gave no new diagnosis and he certainly had no thought of publishing a new species. His publication was very simple and clearly shows that he was merely identifying some plant of Labrador with *E. latifolia* of Willdenow's Species Plantarum.

latifolia. 2. E. foliis ovatis dentato-palmatis, floribus spicatis, corollis tubulosis, laciniis labii inferioris obtusis. *Willd. sp. pl.* 3, *p.* 192.

[1] Rostr. Bot. Tidsskr. iv. 47 (1870).
[2] Hook. Fl. Bor.-Am. ii. 106 (1838).

Icon. *Sabb. hort.* 3. *t.* 7. *Moris. hist.* 3. *s.* 11. *t.* 24. *f.* 8.
In Labrador. *Colmaster.* ⊙. July. *v. s. in Herb. Dickson.*
Flowers smaller, pale purple.[1]

Pursh, as stated, was obviously simply identifying a plant in Dickson's herbarium with the already published *Euphrasia latifolia* L. (and subsequently Willd.), giving word-for-word Willdenow's diagnosis of a plant of southern Europe and northern Africa (which does not belong even to the genus *Euphrasia* as now accepted, but to *Parentucellia*) and citing two plates of the latter.

Only by one comparative phrase, "Flowers smaller, pale purple," thrown in as a comment, did Pursh depart from the literal copying of Willdenow's description of *Euphrasia latifolia* L., i. e. *Parentucellia latifolia* (L.) Caruel. The latter plant has red flowers 1–1.5 cm. long, much larger than in any North American species of true *Euphrasia.* Pursh's comparative comment, if meant to indicate that the Labrador specimen which he saw in Dickson's herbarium had "Flowers smaller" than in *E. latifolia* L. of the Mediterranean region, would, consequently, be quite useless in making out which of the 11 Euphrasias known from the Labrador Peninsula he might have seen. Pursh's comparative comment should be interpreted, however, like parallel cases in his *Flora:* he was comparing the plant which he misidentified with the Mediterranean *E. latifolia* with the species preceding it in his *Flora*, his *E.* "*officinalis* . . . In Canada. *Michaux.* . . . *v. s.* Flowers white, with purple veins." Since the Michaux plant, as shown by his material at Paris which I have examined, is the only *Euphrasia* known in the region of Canada traversed by either Michaux or Pursh, *E. canadensis* Towns., which, as defined by Wiegand and me from full field-knowledge of it, has "corolla 5–6.5 mm. long, white with lavender or bluish veins," it should be clear that Pursh's critical note, that the Labrador plant has "Flowers smaller, pale purple," may have some real significance. Of the 11 Euphrasias known from Labrador 6 (*E. Oakesii, E. Williamsii* var. *vestita, E. purpurea* and vars. *Randii* and *Farlowii*, and *E. disjuncta*) have flowers measurably smaller than in *E. canadensis* (the Canadian "*E. officinalis*" of Pursh's Flora), and of these *E. Williamsii* var. *vestita, E. purpurea* and *E. purpurea* var. *Randii* have the flowers purple, though there may be a lilac tinge on the upper lip of the others. Unfortunately, the plant which Pursh saw in Dickson's herbarium is not now known; though, in view of the facts, that Pursh was merely misidentifying it with a

[1] Pursh, Fl. Am. Sept. ii. 430 (1814).

species of another genus and that the name *E. latifolia*, misapplied by him, had already been preëmpted by Linnaeus, the search for the plant in Dickson's herbarium might seem a needless one. But, still more unfortunately, several European botanists have magnified Pursh's misidentification of a Labrador plant with *small, purple flowers* with a Mediterranean plant of another genus into an assumption that Pursh intended to describe a new species! Consequently, the name *Euphrasia latifolia*, wrongly ascribed to Pursh, has got very extensively into the literature of *Euphrasia* and far-reaching conclusions have been drawn therefrom.

Hooker, having material of the remotely flowered *Euphrasia disjuncta*, with smallish white corollas, from the Canadian Rocky Mts., called it, as already noted, *E. officinalis*, "β. var. rotundifolia, laxiflora.—E. latifolia. *Ph. l. c.* (*non* L.)." Lange, after properly publishing *E. arctica* in 1870, discovered Hooker's identification here quoted and, apparently not taking the trouble to learn the character of Pursh's original publication, abandoned his own well published *E. arctica*, with white corollas 5–8 mm. long, and in the text accompanying his beautiful plate in Flora Danica (t. mmdccccx.) reduced it to varietal rank as *E. officinalis* var. *latifolia* (Pursh). Lange's synonymy there given (in 1877) was as follows: "E. latifolia *Pursh* Fl. Am. sept. 2, p. 430; E. officinalis var. rotundifolia *Hook.* Fl. Amer. bor. 2, p. 106; E. arctica *Lge.* (Bot. Tidskr. I. 4, p. 47)," in explanation of which Lange made the "*Obs.* Ex definitione *Hookerii* l. c. nostra planta respondere E. latifolia *Pursh.*"

As pointed out in a preceding paragraph, Pursh was merely misidentifying some plant of Labrador with *small purple flowers* with the Mediterranean *E. latifolia* L. If it be maintained that by his phrase "Flowers smaller, pale purple" Pursh was defining a new species, it must at least be admitted that the only plants known with small and purple flowers which he could have seen from Labrador are the three already enumerated, *E. Williamsii* var. *vestita* with purple (usually chocolate-purple) corollas only 2.5–4 mm. long, and *E. purpurea* and its var. *Randii*, with deep-purple to pale-roseate corollas also only 2.5–4 mm. long. Pursh certainly was not describing the plant with white corollas 5–8 mm. long, so beautifully illustrated by Lange and supposed by him to be "E. latifolia *Pursh.*" The plant which Hooker had from the Rocky Mountains is the slender species with small and remote white flowers (corollas 4–5.5 mm. long), *E. disjuncta*, and not

Type of Aster Tradescanti, × ⅔

conspecific with the plant of Greenland, Iceland and the Faeröes illustrated by Lange. Incidentally the name, *E. officinalis*, var. *rotundifolia* started with Lange; Hooker had given it no name, merely "β. var. rotundifolia, laxiflora," this descriptive phrase not constituting a true *name*. Eliminating from Lange's publication in Flora Danica the citations which do not belong to the species he described and illustrated, we have left the characteristic subarctic species which he had already properly published as *E. arctica*.

Wettstein, misled by the earlier literature, took up *E. latifolia* as of Pursh, with *E. arctica* Lange as a synonym, in his great *Monographie der Gattung Euphrasia* (1896) and, quite naturally, he has been followed by others who have not realized the errors involved. Wettstein, however, himself realized the doubt surrounding the name *E. latifolia* as used by Pursh, but since *E. latifolia* L. (the description of which Pursh had directly copied from Willdenow) is now removed to *Parentucellia*, Wettstein felt that something Labradorean should be attached to the name in Pursh's sense. Unfortunately, however, such slight characterization as can be deduced from Pursh's "Flowers smaller [than in *E. canadensis*, with white corollas smaller than in *E. arctica*], pale purple" leads in the direction of *E. purpurea*, rather than to the large- and white-flowered *E. arctica*. However that may be, the homonym-rule now effectively disposes of *E. latifolia* Pursh in Wettst. Mon. Euphr. 136 (1896), for *E. latifolia* L. (1753) abundantly antedates it.

Mr. H. W. Pugsley[1] feels, I do not understand why, that there is doubt as to what Lange meant by *E. arctica*. Lange's description, published by Rostrup, was clear; in Flora Danica where, following the wholly uncomprehending suggestion of Hooker, Lange revived the indefinite "*E. latifolia* Pursh," he placed his own *E. arctica* unequivocally with it and illustrated in an unexcelled plate the common plant of Greenland, Iceland and the Faeröes, with white corollas 5–8 mm. long. Wettstein, likewise, did not hesitate to treat *E. arctica* as the boreal plant described and illustrated by Lange, though he perpetuated the error of calling it "*E. latifolia* Pursh."

In view of this seeming clarity (clarity most unusual in taxonomic work prior to the very recent insistence upon designating a "type") as to what Lange actually meant by *Euphrasia arctica*, it is quite perplexing to find Pugsley doubting the identity and substituting for

[1] Pugsley, *A Revision of the British Euphrasiae*, Linn. Soc. Journ., Bot. xlviii. 490, 492 (1930).

"*Euphrasia latifolia* Pursh ex Wettstein" the new name *E. frigida.* Pugsley's substitution was made in a foot-note quoted below:

> The recent Congress at Cambridge having decided to reject homonyms, the name *E. latifolia* cannot be used. It is therefore proposed, as some doubt attaches to the identity of *E. arctica* Lange, to substitute a fresh name EUPHRASIA FRIGIDA.

Surely, if there is any doubt whatever (which I am unable to discover) regarding the real identity of *Euphrasia arctica* Lange, there is hopeless doubt regarding the exact identity of *E. frigida* Pugsley. Tossed off as an afterthought in a foot-note, as a substitute, without any type designated, for "*E. latifolia* Pursh ex Wettstein," it goes directly back for its typification, first to Wettstein, then to Pursh. As already emphasized, Pursh did not definitely publish a new species; he merely misidentified a plant of Labrador with a Mediterranean plant now put into a different genus. The only comment which can possibly be cited as constituting a new diagnosis by Pursh indicates, if it indicates anything, one of the very small-flowered Labradorean species, perhaps either *E. purpurea* Reeks or *E. Williamsii* Robinson, with purple (not white) corollas rarely 4 mm. long. Wettstein also includes *E. officinalis* "var. *rotundifolia* Hook.," which was based solely on a collection of the white-flowered *E. disjuncta* Fern. & Wieg. His other citations may or may not be conspecific with *E. arctica;* they cannot be at the same time conspecific with that, with *E. disjuncta* and with *E. purpurea* or *E. Williamsii* (one or the other of these two presumably the plant which Pursh had). Although there seems no justification for the new name *E. frigida,* its publication would have added less to the confused ideas already prevailing if its author had taken pains to give it a definite typification; and by refraining from publishing an ill defined name he could have prevented hours of futile plodding through the obscure paths of nomenclature.

E. STRICTA Host. Already well known from southeastern Newfoundland, now recorded from the West Coast: sandy and gravelly strand west of Bard Harbor, St. John Bay, *Fernald & Long,* no. 29,027; wet open hillside, Neddy Harbor, Bonne Bay, *Harlow Bishop,* no. 532.

E. AMERICANA Wettst. The commonest species of southern and central Newfoundland, in dry open soil, extending north to Notre Dame Bay, the Exploits Valley and St. John Bay.

Pugsley, in his *Revision of the British Euphrasiae,* Linn. Soc. Journ., Bot. xlviii. 521 (1930), seems to refer *E. americana* to the European

E. brevipila Burnat & Gremli. At least, at the end of his discussion of *E. brevipila* he says:

A form apparently inseparable from this species is found in Newfoundland and Canada—possibly an introduction from Europe. This is represented in the exsiccata[e], Macoun, No. 1696 (Cape Breton), Fernald, No. 3989 (Newfoundland) and Fernald, No. 8026 (Magdalen Is., Quebec).

The numbers of my own (and others') collecting, *i. e. Fernald, Wiegand & Kittredge,* no. 3989 and *Fernald, Long & St. John,* no. 8026, are before me and they are very characteristic *Euphrasia americana,* as usual with the leaves and bracts glabrous; while, as Pugsley correctly states, in the European *E. brevipila* they are "all *clothed . . . with ± shortly stalked glands and short bristles.*" In *E. americana* the flowers are borne only on the upper half of the stem and branches, the first flowers of the central axis appearing (in well developed plants) at the 8th–11th node; and in mature fruiting plants the base of the central inflorescence is about midway on the axis. In the glandular European *E. brevipila,* however, as shown by Wettstein's plate (his t. vii. fig. 8) and by various European specimens (*Braun-Blanquet,* Fl. Raet. Exsicc. no. 676; *Pampanini,* Fl. Ital. Exsicc. no. 339; *Palmér,* Fl. Suec. no. 1079; *Fernald, Pease & Long,* no. 2377, identified by Pugsley; and unnumbered specimens from Fries, Fröman, Asplund and others) the central inflorescence (on the main axis) occupies, when fully developed, three-fourths to five-sixths of the entire central axis; the first flowers of the central axis appearing at the 5th–8th node. In *E. americana* the lower lip is white (only rarely bluish), but with bluish or purple veins; in *E. brevipila* the corolla is usually purplish or bluish ("Corolla pallide violacea vel coerulea"—*Wettstein;* "*Corolla . . . lilac*"—Pugsley). In *E. americana* the mature capsules are distinctly exceeded by the calyx, in *E. brevipila* not exceeded by it ("Capsula . . . calycem aequans vel superans"—*Wettstein;* "Capsule . . . equaling or exceeding the calyx-teeth"—*Pugsley*). Other characters, in the corolla and the calyx, could be pointed out which at once differentiate *E. americana* from *E. brevipila,* but those already indicated are sufficient. I have before me at this writing 141 numbers of *E. americana,* with the collecting of more than 50 of which I have been personally concerned. Like all the annual species it varies in stature (up to 4.4 dm. high), degree of branching and size of foliage and bracts; but in its essential characters it is abundantly distinct from the glandular-pubescent, low-flowering European *E. brevipila* with bluish to lilac corollas and short fruiting calyx.

OROBANCHE TERRAE-NOVAE Fern. RHODORA, XXVIII. 235 (1927).

Since *Orobanche terrae-novae* was proposed as a species excellent additional characters have been detected in the capsules and seeds. Fruiting material from several stations in Newfoundland, as well as from Anticosti, shows that the capsules are lance-conic, more easily pushing off the marcescent corollas than in the continental *O. uniflora* L., which has the ovoid capsules usually closely invested by the marcescent corollas. In *O. terrae-novae* the seeds (FIG. 2) are more elongate,

FIG. 2. Seeds, × 45, of OROBANCHE TERRAE-NOVAE.

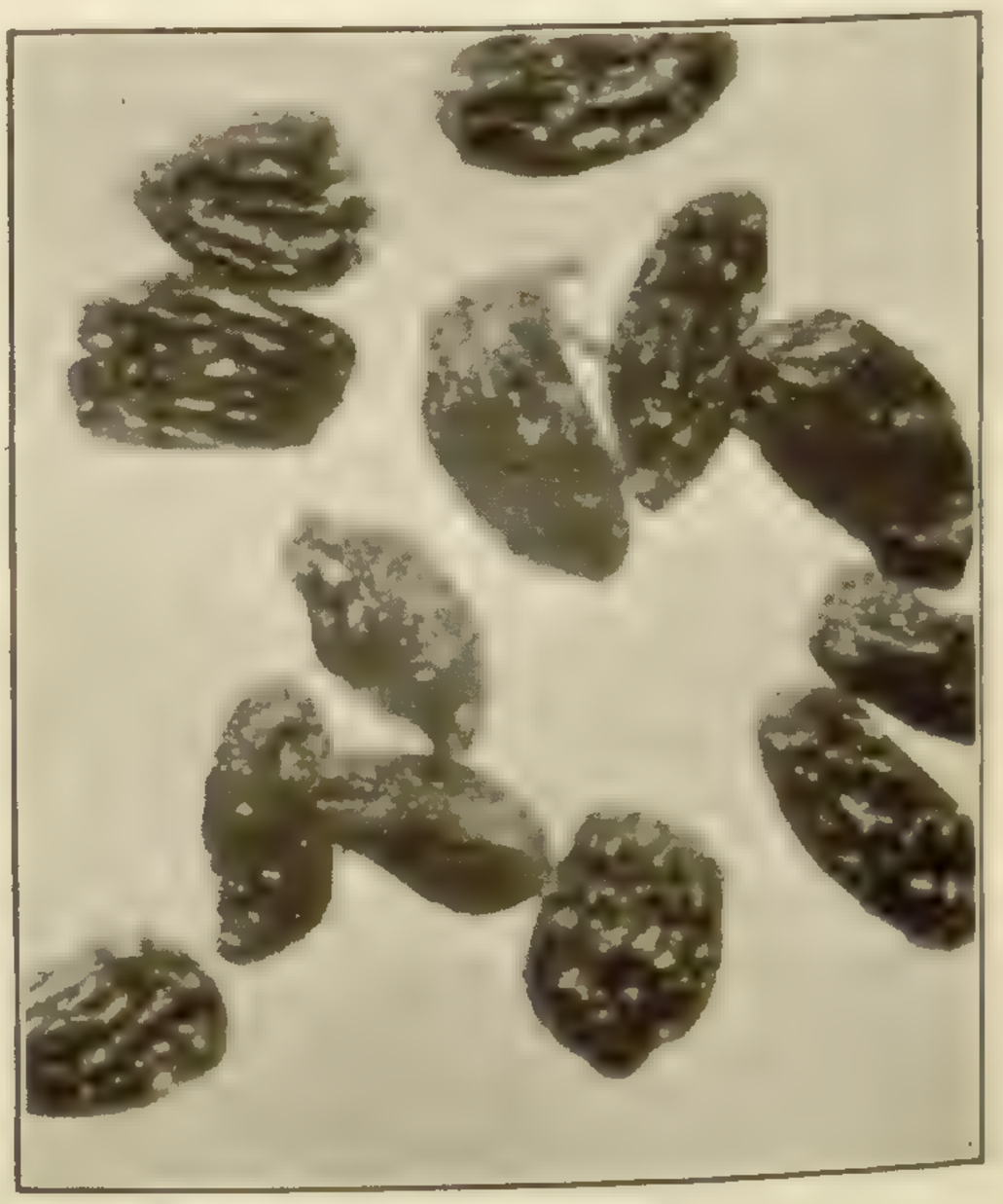


FIG. 3. Seeds, × 45, of OROBANCHE UNIFLORA.

with more delicate reticulation than in the continental *O. uniflora* (FIG. 3) or in the western *O. Sedi* (Suksd.) Fern. In the latter species they are rounded-ellipsoid and shorter than in *O. uniflora* and even more reticulate. See pp. 48, 95.[1]

*PLANTAGO MAJOR L., var. ASIATICA (L.) Dcne. BONNE BAY: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 2018; brackish swale near mouth of McKenzie River, no.

[1] Since the paragraph on *Orobanche* went into type, *A revision of the section Gymnocaulis of the genus Orobanche*, by Daisy M. Achey, has appeared—Bull. Torr. Bot. Cl. lx. 441–451 (June, 1933). Miss Achey reduces *O. terrae-novae* to varietal rank as *O. uniflora* L., var. *terrae-novae* (Fern.) Achey, l. c. 444 (1933). She seems not to have specially studied the capsules and seeds (FIGS. 2 and 3), usually very conservative structures, and she finds support in my statement, in the original discussion, that "*Orobanche terrae-novae* is perhaps merely a geographic variety," quoting the suggestion without the qualifying "perhaps." FIG. 2 shows seeds, × 45, of *O. terrae-novae* from Bard Harbor Hill, *Fernald & Long*, no. 29,053; FIG. 3, seeds, × 45, of *O. uniflora* from Johnston, Rhode Island, May 30, 1890, *J. F. Collins*.

ASTER TRADESCANTI: portion of plant, × ½, of *A. saxatilis*, from Nova Scotia.

2019. See p. 92. Collected by Mrs. Ayre in September, 1932 "miles from anywhere" in the region of Salmonier.

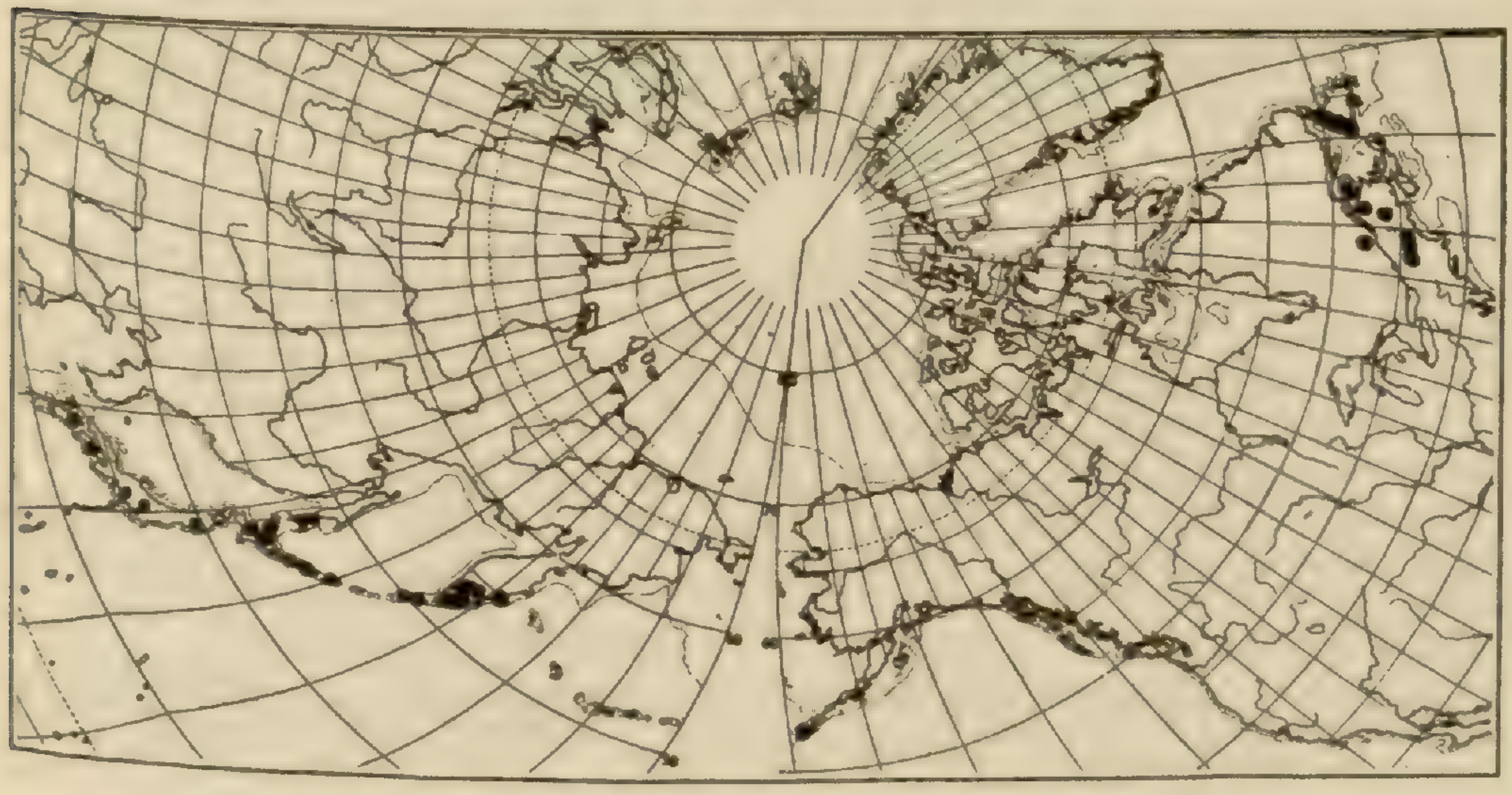
In the present wholly unsatisfactory state of our knowledge of the *Plantago major* group I am leaving the indigenous circumpolar plant as a variety of *P. major*. A thorough study of the group in America is much needed.

*P. LANCEOLATA L., var. SPHAEROSTACHYA Mert. & Koch, f. VERNALIS Béguinot BAY OF ISLANDS: turfy pasture-slope, Curling, *Fernald, Long & Fogg*, no. 2020.

Forma *vernalis*, characterized by short elliptic-ovate, instead of elongate leaves, and by very short, subglobose spikes, seems not to have been recorded in America.

GALIUM KAMTSCHATICUM Steller. To the recorded Newfoundland stations add the following. BONNE BAY: damp thicket under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 2023. VALLEY OF HARRY'S BROOK: near Force-le-Plain, *R. B. Kennedy*, no. 332.

Galium kamtschaticum is a very notable case of bicentric distribution: northeastern Asia and adjacent Aleutian Islands, and northeastern America (MAP 25). I have tried in vain to separate our eastern



Map 25. Bicentric Range of GALIUM KAMTSCHATICUM.

American plant (*G. Littellii* Oakes; *G. circaezans*, var. *montanum* T. & G.) from the Asiatic but in every important point the two seem the same. *G. kamtschaticum* has been recorded from Washington and Oregon, but the plant of that area has several very evident characters (stiffer texture; 5–9, instead of 2–4, primary whorls of leaves; blades

narrower and with strikingly different venation; flowers more numerous; corolla of thicker texture, with obtuse, instead of acute, lobes; styles elongate, instead of sub-suppressed; etc.). The plant of Washington and Oregon is the thoroughly distinct *G. oreganum* Britton. Since the map was engraved I have learned of the occurrence of *G. kamtschaticum* in Corea.

Sambucus pubens Michx. The northernmost station known on the West Coast is on Bonne Bay: base and lower slopes of Gros Morne, *R. H. Kimball*, no. 88.

The broader and more open as well as much larger inflorescences, the usually more oblong-elliptic leaflets well grown at flowering time and the more coarsely rugose seeds seem sufficiently to separate the American *Sambucus pubens* from the European *S. racemosa* L. Typical *S. pubens* has at least the young leaves somewhat pubescent beneath. However, the foliage may be wholly glabrous from the first.[1]

Campanula rotundifolia L., var. alaskana Gray.

The more extreme plants with oblanceolate or lanceolate to oblong or narrowly obovate cauline leaves is very marked, but in some colonies there is clear intergradation with the commoner forms with cauline leaves linear.

The following eastern American material is referred to var. alaskana. Newfoundland: sandy and turfy seashore, Bard Harbor, St. John Bay, *Fernald & Long*, no. 29,093; peat and turf bordering gravelly limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 2039; grassy strand, Ingornachoix Bay, *Fernald, Wiegand & Kittredge*, no. 4068; peaty and gravelly open slopes, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 434. Quebec: bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, *Fernald & Collins*, no. 1179. Nova Scotia: old cellar, Trinity Cove, and rocky slope, Atlantic Cove, St. Paul Island, *Perry & Roscoe*, nos. 376, 377.

See p. 56.

[1] Sambucus pubens Michx., f. **calva**, f. nov., foliis ramulisque glabris.—Occasional through the range of the species, eastern Quebec to southern British Columbia, south to Connecticut, New Jersey, Ohio and Washington. Type: thickets in Fernald Pass, alt. about 850 m., between Mts. Mattaouisse, Fortin and Logan, July 13, 1923, *Fernald Griscom & Mackenzie*, no. 26,030 (in Gray Herb.).

Other forms of *S. pubens* are

S. pubens, f. **leucocarpa** (T. & G.), comb. nov. *S. pubens*, *β. leucocarpa* T. & G. Fl. ii. 13 (1841). *S. racemosa*, f. *leucocarpa* (T. & G.) House, N. Y. State Mus. Bull. 243–244: 69 (1923).

S. pubens, f. **xanthocarpa** (Cock.), comb. nov. *S. racemosa*, f. *xanthocarpa* Cock. Bull. Torr. Bot. Cl. xviii. 170 (1891). *S. pubens*, var. *xanthocarpa* Nieuwl. Am. Mid. Nat. iii. 310 (1914). *S. racemosa*, f. *chrysocarpa* Eames & Godfrey, Rhodora, xviii. 239 (1916). *S. racemosa*, f. *xanthocarpa* House, N. Y. State Mus. Bull. 243–244: 41 (1923).

S. pubens, f. **dissecta** (Britt.), comb. nov. *S. pubens dissecta* Britt. Mem. Torr. Bot. Cl. v. 304 (1894).

LOBELIA DORTMANNA L. The northern known limits in Newfoundland are on Notre Dame Bay and Bonne Bay. NOTRE DAME BAY: Tilt Cove, *Fernald, Wiegand & Darlington*, no. 6274. BONNE BAY: shallow pools in bog-barrens at 400–550 m. alt., tableland of Lookout Mt., *R. H. Kimball*, no. 61, *Fernald, Long & Fogg*, no. 2041. See p. 85 and MAP 8.

*SOLIDAGO HISPIDA Muhl., var. LANATA (Hook.) Fern. RHODORA, x. 87 (1908). The only Newfoundland station known is from PORT AU PORT BAY: dry exposed ledges and shingle on the limestone tableland, Table Mt., *Fernald & St. John*, no. 10,867.

S. HISPIDA, var. DISJUNCTA Fern. RHODORA, xvii. 2 (1915). To the type station (on the Humber) add BONNE BAY: turfy slopes below limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 2049.

S. HISPIDA, var. ARNOGLOSSA Fern. l. c. (1915). To the two stations originally published add the following. BONNE BAY: basaltic talus near mouth of Wallace's Brook, *Fernald, Long & Fogg*, no. 2046. BAY OF ISLANDS: peaty and gravelly thickets, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 441. See p. 7.

S. CALCICOLA Fern. Already well known from the valleys of the Exploits and Harry's River (or Brook), now extended north to BONNE BAY: quartzite gravel and talus, slopes of Killdevil, *Fernald, Long & Fogg*, no. 2044. See p. 88.

*S. LEPIDA DC., var. ELONGATA (Nutt.) Fern. RHODORA, xvii. 9 (1915). BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *Fernald & Long*, no. 2060. See p. 91.

Already well known in the East from the Gaspé Peninsula, Anticosti, the Côte Nord and Lake St. John.

S. CANADENSIS L. Rare in Newfoundland. The following material is before me. VALLEY OF THE EXPLOITS: dry rocky clearings, Grand Falls, *Fernald, Wiegand & Darlington*, no. 6304. LOWER HUMBER VALLEY: dry limestone gravel, Hannah's Head, *Fernald & Long*, no. 2061. BAY OF ISLANDS: woods, Goose Arm, August 21, 1896, *Waghorne*. See p. 94.

BELLIS PERENNIS L. Although a frequent casual, persisting on garden refuse, the English Daisy is completely naturalized near the head of Humber Arm of BAY OF ISLANDS: pasture-turf, Crow's Gulch and turfy slope, Curling, *Fernald, Long & Fogg*, nos. 2073, 2074. BONNE BAY: turfy roadside, Woody Point, no. 2075. See p. 15.

ASTER RADULA Ait. The typical southern plant extends north to BONNE BAY: open marsh land, Bonne Bay, *Harlow Bishop*, no. 589; gravelly shores and alluvial islands near mouth of Main River, *Fernald, Long & Fogg*, no. 2062.

*A. ACUMINATUS Michx. Very local. BAY OF ISLANDS: spruce woods on southern slope of Lark Mt., *Fernald, Long & Fogg*, no. 460. REGION OF CAPE RAY: spruce thickets among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,139. See p. 4.

*A. NEMORALIS Ait., VAR. MAJOR Peck. Var. *Blakei* Porter. Known in Newfoundland only from REGION OF CAPE RAY: spruce thickets among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,141.

THE IDENTITY OF ASTER TRADESCANTI.—After the very extensive studies by Wiegand,[1] it might seem the part of discretion to let well enough alone and to refrain from raising anew the question of the identity of the long-baffling *Aster Tradescanti* L. The type of the latter (PLATE 261), however, is so definite and its similarity in every obvious point to one of the characteristic species occurring in Newfoundland, Quebec, Nova Scotia, New England and northern New York is so complete, that I feel that the long and vacillating career of *A. Tradescanti* as an unrecognizable species is now at an end.

After prolonged study of the bases of *Aster Tradescanti*, Asa Gray selected to stand as its type a specimen at the British Museum of a plant in the *Hortus Cliffortianus* herbarium, which had been raised from seed received from Morison of his *A. Virginianus ramosissimus serotinus parvis floribus albis Tradescanti*, Morison, Hist. iii. 121 (1715), "whence the name." In the Clifford herbarium Gray designated as "vera" the plant he had, rightly, selected as type; and in 1903, while photographing types at the British Museum, I made a silhouette-like and unfortunately vague portrait of it (PLATE 261), × ⅔. Of this type Wiegand concludes:

> This photograph does not seem to match any American form [of *A. paniculatus* Lam.] unless it be a shade condition of some normally wild form. The specimen may have come from shaded or crowded colonies in the garden. The heads are rather small, but are not fully developed, and possibly would have been larger if they had matured. The rameal leaves are more elliptic, more lax, and less rigid than in all forms of the species, but resemble somewhat those of *A. saxatilis*. Indeed, the photograph suggests *A. saxatilis* very much in the panicle and rameal leaves, but the cauline leaves are more divaricate. There is, however, no reason to believe that the low and slender *A. saxatilis* was in cultivation in Europe at that early period. In the opinion of the writer, this Morison plant [*i. e.* the Clifford plant, raised from Morison's seed] may very likely have been simply an undeveloped shaded individual of [*A. paniculatus*] var. *simplex*, but we have no way of proving this. It may, however, have been a hybrid form of *A. paniculatus* with *A. lateriflorus* or *A. vimineus*. . . . Because of this extremely vague and indefinite status of the name [*A. Tradescanti*] the writer believes that the best interests of taxonomy are served by abandoning it altogether.[2]

Wiegand's discussion of the type of *Aster Tradescanti*, above quoted,

[1] Wiegand, RHODORA, XXXV. 29–31 (1933).
[2] Wiegand, l. c.

contains the highly important statement that "the photograph suggests *A. saxatilis* very much in the panicle and rameal leaves"; but he dismisses without further consideration this very happy observation because, for some reason not clear to me, he felt that there is "no reason to believe that the low and slender *A. saxatilis* was in cultivation in Europe at that early date."

In my younger days, absorbing everything which pertained to the discovery and early exploration of my native state, I extracted from the "Voyages" of Champlain, Weymouth and others the amazing store of "first records" of plants of the region. Consequently, I am puzzled by Wiegand's dismissal of the periods of Morison and of Linnaeus (*Hortus Cliffortianus*) as too early for the eastern American *Aster saxatilis* to have been carried back to the gardens of Europe. Morison's account of *A. Tradescanti* was published in 1715: "Aster *Virginianus ramosissimus serotinus parvis floribus albis Tradescanti, Nobis.* . . . *florum* alborum, stellatorum, minimorum, ornati"; Linnaeus's account in Hort. Cliff. (408) in 1737. For several decades prior to Morison's date hundreds of eastern American species had been in European gardens, many of them appearing in the herbals of the 16th century; and the classic *Canadensium plantarum Historia* of Cornut, who dealt with American plants introduced into European gardens, was published in 1635.

Aster saxatilis (Fernald) Blanchard is a very neat plant of the river- and lake-shores of Newfoundland; of Nova Scotia; of Quebec, from Lake St. John to the neighborhood of the city of Quebec; of the Penobscot, Kennebec, Androscoggin, Merrimac, Connecticut and numerous smaller rivers of New England, including shores at Machias, Damariscotta and other early-explored coastal points; also shores of Lake Champlain and of smaller lakes in the Adirondack region. More than a century before Morison's account of *A. Tradescanti*, Champlain, with his highly botanical associate, Lescarbot, explored, and started colonies on, the coasts of Nova Scotia, Maine and elsewhere in eastern America. They even ascended the Penobscot to the very ledges along the Stillwater Branch of that river, which are the type-locality of *A. saxatilis;* and they recorded the necessity of there ceasing their up-river explorations because of the impossibility of taking their ships past the ledge-crowded water-falls. They also spent some time in the region of Machias and of Damariscotta. At approximately the same time (1605), Captain George Weymouth,

exploring the same coasts, specially recorded the plants seen and took back to England seeds and roots (among them the Weymouth Pine, *Pinus Strobus*). Surely, *Aster saxatilis* had plenty of opportunity, prior to 1715, to reach European gardens from Nova Scotia or Maine, to say nothing of Newfoundland, Quebec and the Lake Champlain region.

It is, consequently, worth while to reproduce the photograph, poor as it is, of the plant in the Clifford herbarium, properly selected by Gray as the type of *Aster Tradescanti* (PLATE 261) and, likewise, to show, but on smaller scale (× ½), the top of a characteristic plant (PLATE 262) from Digby Neck (opposite Weymouth) in Nova Scotia, a specimen labeled and cited by Wiegand as typical *A. saxatilis*. This wild specimen, *Fernald & Long*, no. 22,762, of "the low and slender *A. saxatilis*," to use Wiegand's words, is 2 feet, 2½ inches high, the slender stems ("cauliculos graciles") of the plant cultivated by Morison were "binos aut tres pedes altos." No. 22,762 is a common and attractive plant of the region where, in 1605, the French sailed through Digby Gut to found Port Royal (now Annapolis Royal); and a specimen sent by *Mrs. Agnes M. Ayre* from the Avalon Peninsula in Newfoundland comes from a region where European colonists had settled as early as 1580.

The opportunities for seeds or roots of *Aster saxatilis* to have been carried to Europe before 1715 were, as sufficiently emphasized, apparently more numerous than Wiegand realized; and the similarity of a loosely grown indigenous specimen of it to the type of *A. Tradescanti* is so striking (even to the "*folia* palmum longa, salignea, angusta, . . . in ambitu sparsis *denticulationibus* serrata" of Morison's account) that I find myself fully subscribing to Wiegand's statement, that "Indeed, the photograph suggests *A. saxatilis* very much." It seems to me so satisfactory a match that, as one of the godfathers of the latter, I find myself abandoning the name *A. saxatilis* (Fern.) Blanchard (1904) in favor of A. TRADESCANTI L. (1753). That Asa Gray was baffled by the type of *A. Tradescanti* was quite natural, for, like Wiegand, he was trying to fit it to some native specimen of *A. paniculatus*. In Gray's time there was no material of *A. saxatilis* in American herbaria.

ERIGERON HYSSOPIFOLIUS Michx., var. VILLICAULIS Fern. RHODORA, xvii, 17 (1915). Originally described from Table Mt., Port au Port Bay. Occasional on the West Coast northward to the Straits; also on Anticosti. The following additional Newfoundland stations may be

recorded. Ha-Ha Bay: turfy or gravelly shelves, crests or talus of diorite, Ha-Ha Mt., *Pease & Griscom*, no. 29,137. Straits of Belle Isle: dry soil, Poverty Cove, *M. E. Priest*, no. P1; turfy or peaty pockets in limestone ledges, Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 27,143; dry horizontal limestones, Rock Marsh, Flower Cove, *Fernald, Long & Dunbar*, no. 27,142. St. Barbe Bay: limestone barrens near Ice Point, *Wiegand, Gilbert & Hotchkiss*, no. 29,136; St. John Bay: peaty margins of dry limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 2071. Ingornachoix Bay: dry peaty and turfy limestone barrens, Gargamelle Cove, no. 2072; calcareous rocks and talus, entrance to Port Saunders Harbor, *Fernald, Wiegand & Kittredge*, no. 4136.

Var. *villicaulis* is not always villous. Its chief characters are its low and depressed habit, crowded lower leaves (mostly obtuse), and its scapiform peduncles.

(*To be continued*)

ANTENNARIA COLUMNARIS, × 1; insert × 2.

Antennaria Foggii, × 1; insert × 2.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 315*)

The Genus Antennaria in Newfoundland.—In 1924 I published a brief synopsis of *The Dwarf Antennarias of Northeastern America*, Rhodora, xxvi. 95–102 (1924). At that time 6 species and 2 varieties of the genus were known in Newfoundland. Now, after four additional seasons in the field, we know 16 species and 2 varieties of *Antennaria* on the Island. In view of the great technical difficulty of the group, a new key to the Newfoundland representatives of the genus is offered and the new species are illustrated.

a. Basal leaves erect, oblanceolate to elliptic-acuminate, 2–18 cm. long, similar to the cauline ones: staminate and pistillate plants intermixed, becoming 1–2.5 dm. high; the inflorescences of the former soon shriveling: involucres deep-brown to blackish: plants sparingly or not at all stoloniferous.....1. *A. eucosma.*

a. Basal leaves spreading, forming depressed rosettes, strongly contrasting in outline with the ascending cauline leaves: only the pistillate plants known; these humifuse or freely stoloniferous....*b.*

b. Larger basal leaves 1–5 mm. wide, blunt or only obscurely or minutely mucronulate, whitened above: flowering stems only 0.5–18 cm. high: involucres deep-brown to blackish or, if pale, at most 7 mm. high....*c.*

c. Cauline leaves 15–28, very crowded (except in old and "drawn" plants); the upper 7–20 with twisted scarious linear-lanceolate to linear-acicular tips 2–3 mm. long: taller flowering stems up to 4 (very rarely to 6) cm. high: involucre conspicuously imbricated, with 3–4 very unequal series of bracts.....2. *A. columnaris.*

c. Cauline leaves 4–16; the upper 1–7 with scarious tips; taller flowering stems mostly 4–18 cm. high (only exceptionally and when very young less than 4 cm.): involucre with the bracts subequal or in 2 or 3 unequal series, with 4–6 series in no. 10, which has but 8–10 remote cauline leaves (only the upper 3–5 appendaged) ....*d.*

d. Involucres deep-brown to blackish; the bracts subequal or in 2–3 unequal series....*e.*

e. Involucres with the lower half prolonged, green and viscid, with the bracts closely and firmly appressed or agglutinated to form an ellipsoid-campanulate falsely gamophyllous cup, 7–9 mm. high: corollas 5–5.5 mm. long.....3. *A. Foggii.*

e. Involucres with loose and distinct bracts: corollas 3–5 mm. long....*f.*

f. Bracts conspicuously unequal, in 3 series; the outer about half as long as the inner: corollas 4–5 mm. long....*g.*

g. Cauline leaves 6–9; the 2–3 upper with a somewhat unguiculate lance-subulate tip 0.6–1.5 mm. long: involucre 6–7 mm. high, with 20–25 bracts; the outer and median series with scarious tips 1.2–2 mm. broad: corollas 4–4.8 mm. long: style included or barely exserted, entire or subentire: achenes 1.1–1.4 mm. long, papillate.....4. *A. Bayardi.*

g. Cauline leaves 8–14; the 4–5 upper with a narrowly oblong or lanceolate scarious tip 2–3.5 mm. long: involucre 7.5–9 mm. high, with 25–35 bracts; the outer and median with tips 2–2.5 mm. broad: corollas 4.8–5 mm. long: style exserted, bifid: achenes 1.8 mm. long, glabrous.....5. *A. brunnescens.*

f. Bracts subequal, in 2–3 series; the outer nearly as long as the inner....*h.*

h. Flowering stems at most 1.2 dm. high, with 5–8 leaves; the 3–6 upper leaves with flag-like oblong-lanceolate flat tips....*i.*

i. Involucres 7–10 mm. high, with squarrose pale-brown bract-tips 1.3–2 mm. broad: the upper 3–4 cauline leaves with scarious tips: corollas 4–4.5 mm. long: achenes 1.2–1.4 mm. long.....6. *A. cana.*

i. Involucres 6–7 mm. high, with ascending fulvous bract-tips rarely more than 1 mm. broad: the upper 4–6 cauline leaves with scarious tips: corollas 3–4 mm. long: achenes 1.6–1.8 mm. long.....7. *A. vexillifera.*

h. Flowering stems slender, up to 18 cm. high, with the 8–15 leaves mostly subulate-tipped; only the uppermost with lance- or linear-involute scarious tips: involucres 5–6 mm. high; the outer and median bracts with oblong-linear ascending tips 1–1.7 mm. broad: corollas 3–3.8 mm. long.....8. *A. confusa.*

d. Involucres milk-white or ochroleucous to pale-brown ....*j.*

j. Cauline leaves 9–15: involucres milk-white or ochroleucous, 4.5–6 mm. high, with 2–3 series of subequal bracts: corollas 3–3.3 mm. long.....9. *A. albicans.*

j. Cauline leaves 8–10: involucres stramineous or pale-brown, 5.5–7 mm. high, with 4–6 series of conspicuously unequal bracts: corollas 3.7–4.2 mm. long.....10. *A. straminea.*

b. Larger basal leaves 2–17 mm. broad, distinctly mucronate or apiculate, green and glabrous to white-tomentose above: flowering stems 0.4–4 dm. high: involucres whitish, greenish or pale-brown, or rarely fulvous, (6–) 7–10 mm. high....*k.*

k. The (2–) 3–6 upper cauline leaves with flat or flattish scarious tips: rosette-leaves only 2–10 mm. broad, gradually narrowed to base, scarcely petioled, with terminal mucro only 0.2–0.5 mm. long....*l.*

l. Basal leaves bright-green and glabrous or promptly glabrate above, spatulate to cuneate-oblanceolate or narrowly cuneate-obovate, rounded at tip; cauline leaves normally 4–9: denuded old receptacles very low, much broader than high....*m.*

m. Stolons and basal offshoots crowded, not elongate: basal leaves 6–15 mm. long, 2–4 mm. broad: flowering stem up to 1.5 dm. high: involucres 6–8 mm. high, brown: corollas 4.5 mm. long: achenes 1.2 mm. long, glabrous.....11. *A. Wiegandii.*

m. Stolons elongate and slender, somewhat cord-like below the terminal rosettes: basal leaves 8–25 mm. long, 3–10 mm. broad: flowering stems up to 2.5 dm. high: involucres 7–10 mm. high; the bracts with white or whitish petaloid tips: corollas 5.5–6 mm. long: achenes 1.4–1.8 mm. long, papillate.....12. *A. spathulata.*

l. Basal leaves white-tomentose above, 2–5 mm. broad, oblanceolate or narrowly obovate, acute or subacute; the cauline 8–14: denuded old receptacles elongate, as high as or higher than broad: involucres white or whitish, 7–9 mm. high: achenes papillate.....13. *A. gaspensis.*

k. The upper cauline leaves with subulate-aristate tips (only the very uppermost, about the corymb, with tips

flattened): rosette-leaves broadly oblanceolate to broadly obovate; the larger 1–5 cm. long, 2–17 mm. broad: corolla and style together 4.8–7 mm. long ....*n.*

n. Stolons and basal offshoots rather short and assurgent (decumbent, with ascending tips): rosette-leaves oblanceolate to broadly obovate; the larger 1–5 cm. long, 2–17 mm. broad: corolla and style together 4.8–5.8 (–6.2 in *A. neodioica* var. *grandis*, unknown in Nfld.) mm. long....*o.*

o. Rosette-leaves oblanceolate to narrowly spathulate-obovate, acute or subacute, gradually tapering to base and scarcely petioled, more or less grayish-tomentose above: flowering stems stiffly erect: cauline leaves 8–18, subapproximate or almost evenly spaced; the tips and bases of successive ones rarely becoming more than 1–4 cm. apart: corymbs compact (except in obviously aberrant individuals), 1–4 cm. broad; the heads subsessile or on rays up to 1 (very rarely to 2.5) cm. long: involucre greenish or light-brown only at base, otherwise lemon-white to milk-white or whitish-brown; its firm chartaceous blunt outer bracts mostly 1.4–2 mm. broad: denuded ripe receptacle shallowly and finely pitted; the pits narrower than the intermediate blunt ridges.....14. *A. rupicola.*

o. Rosette-leaves narrowly to broadly obovate, mostly rounded at summit and abruptly tapering to a petiole, gray-tomentose to green and glabrous above: flowering stems slender, often becoming somewhat flexuous upon elongation: cauline leaves 6–10(–14); the upper, by prolongation of the mature flowering stem, usually becoming very remote (often 3–14 cm. apart): corymbs commonly loose, up to 3–6 cm. broad, with many elongate rays (mostly 1–3 or 4, frequently to 6–10, cm. long): involucres greenish-, purplish-, or brown-tinged, with paler bract-tips: the thin and usually scarious bracts mostly 0.7–1.4 mm. broad: denuded ripe receptacle deeply and coarsely honeycomb-pitted; the pits broader than the thin intermediate walls.....15. *A. neodioica.*

n. Stolons procumbent or repent (lying flat) and elongated or somewhat cord-like below the leafy tips: rosette-leaves oblanceolate, acute; the principal ones 3–6.5 cm. long, 7–17 mm. broad: corolla and style together 6.3–7 mm. long..16. *A. petaloidea* var. *subcorymbosa.*

1. A. EUCOSMA Fernald & Wiegand, RHODORA, xiii. 23 (1911).—Turfy limestone barrens and slopes from Pistolet Bay westward to Four-Mile Cove, Straits of Belle Isle; region of Port au Port Bay and Bay St. George. The following specimens are at hand: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,144; Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 29,147; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,145; *Fernald, Gilbert & Hotchkiss*, no. 29,144; Cape Norman, *Wiegand, Griscom & Hotchkiss*, no. 29,146, *Wiegand & Long*, no.

29,152; Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,148; Big Brook, Straits of Belle Isle, *Fernald & Long*, no. 29,140, *Wiegand, Gilbert & Hotchkiss*, nos. 29,141, 29,142, *Pease & Griscom*, no. 29,143; Half-way Brooks, Straits of Belle Isle, *Pease, Griscom, Gilbert & Hotchkiss*, no. 29,149; Four-Mile Cove, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,150; Table Mountain, Port au Port Bay, *Fernald, Wiegand & Kittredge*, no. 4144 (TYPE), *Fernald & St. John*, no. 10,868, *Mackenzie & Griscom*, no. 10,466; Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,051. Species endemic in Newfoundland.

Whether the broad gap in the known range of *A. eucosma* (between the eastern Straits of Belle Isle at the northeast and Port au Port Bay at the southwest) represents the actual absence of the species from that extensive area seems highly improbable. Many species, originally described from Table Mountain, Port au Port, or from Cape St. George, and subsequently seen on the Straits of Belle Isle, were found by us on the intermediate limestones centering on Pointe Riche (such plants as *Erigeron hyssopifolius* var. *villicaulis* Fernald, *Antennaria albicans* Fernald and *Arnica terrae-novae* Fern.).

The plant of Anticosti, mentioned at the time *A. eucosma* was published as "apparently referable to this species, but the material . . . inadequate for final determination," has been subsequently collected at numerous stations by Bro. Victorin and his associates. It proves to be *A. pulcherrima* (Hook.) Greene.

2. *ANTENNARIA **columnaris**, sp. nov. (TAB. 263), humifusa, caulibus repentibus stragula densa 2–10 cm. diametro formantibus; stolonibus foliosis confertis ad 2 cm. longis; foliis basilaribus oblanceolatis vel anguste obovatis vix petiolatis 5–9 mm. longis 1.5–4 mm. latis vix vel brevissime mucronulatis albido-tomentosis, tomento coactili; caule florifero 0.5–4 (deinde rarissime –6) cm. alto; foliis caulinis 15–28 confertis vel superioribus deinde subdistantibus linearibus erectis, imis obtusis, mediis attenuatis mucronatis 0.7–2 cm. longis 1–2 mm. latis dorso strigosis, superioribus 7–20 apice scarioso lineari-lanceolato vel lineari-aciculari torto 2–3 mm. longo munitis; capitulis femineis 1–6 corymbosis subcylindricis (in statu exsiccato turbinato-campanulato); involucro 5.5–8.5 mm. alto basi lanato; bracteis 30–50 3–4-seriatis valde imbricatis, exterioribus lineari-oblongis obtusis vel subacutis fulvescentibus, interioribus angustioribus acuminatis plerumque fuscis erosis; corolla 4 mm. longo apice purpurascente; stylo purpurascente exserto bifido; achaeniis laevibus 1.2 mm. longis.—NEWFOUNDLAND: dry peaty and turfy limestone barrens, Gargamelle Cove, July 20, 1929, *Fernald, Long & Fogg*, no. 2076 (TYPE in Gray Herb.); peaty and turfy limestone barrens, Pointe Riche, July 24, 1929, *Fernald, Long & Fogg*, no. 2077. See p. 54.

A. columnaris, in the great abundance of cauline leaves, which during anthesis give the flowering stems the appearance of broad columns or (in the lower stems) small barrels, is unique. In many characters it suggests dwarfed *A. confusa* (described below; see PLATE 268) but it has usually many more leaves and very many more of the upper leaves with scarious appendages, and, when well developed, its heads are decidedly larger and with more imbricated bracts. *A. columnaris* also strongly resembles *A. angustata* Greene of Baffin Island and northern Labrador, but that species has the narrower basal leaves prominently mucronate, the cauline leaves few and the upper ones with broad and flat appendages.

3. *ANTENNARIA **Foggii**, sp. nov. (TAB. 264), humifusa, caulibus ramosissimis repentibus stragula 0.3–1.8 dm. diametro formantibus; stolonibus foliosis plus minusve confertis 1–3 cm. longis; foliis basilaribus cuneato-oblanceolatis vel anguste obovatis vix petiolatis 4–16 mm. longis 2–4 (–5) mm. latis apice rotundatis vel subacutis obsolete vel brevissime mucronulatis utrinque albido-tomentosis tomento coactili; caule florifero 4–13 cm. alto floccoso-tomentoso; foliis caulinis 8–16 subdistantibus floccoso-tomentosis, imis linearibus obtusis, mediis linearibus acutis 8–16 mm. longis 1–2.5 mm. latis apice subulatis, superioribus 4–7 (2–3 involucriformibus inclusis) apice scarioso lanceolato 1.5–4 mm. longo munitis; capitulis femineis 1–3 (–5) corymbosis ellipsoideo-campanulatis (in statu exsiccato late campanulatis); involucro 7–9 mm. alto basi viscido-lanato sub medio prolongato viridescente bracteis 30–40 viscidis obscuris valde adpressis vel agglutinatis involucri apice coroniformibus, bractiarum superiorum apicibus 3-seriatis rosulatis oblongis brunnescentibus vel fuscescentibus 1.5–2 mm. latis, interioribus erosis vel eroso-fimbriatis; corolla 5–5.5 mm. longa apice purpurascente; stylo purpurascente exserto bifido; achaeniis laevibus 1.7 mm. longis; planta mascula ignota.—NEWFOUNDLAND, limestone barrens bordering St. John Bay and Ingornachoix Bay: peaty turf on limestone barrens northeast of Old Port au Choix, St. John Bay, July 21, 1929, *Fernald, Long & Fogg*, no. 2100 (TYPE in Gray Herb.); dry gravelly limestone barrens back of Crow's Head, St. John Bay, July 23, 1929, *Fernald, Long & Fogg*, no. 2101; dry gravelly limestone barrens, Pointe Riche, between St. John Bay and Ingornachoix Bay, July 24, 1929, *Fernald, Long & Fogg*, no. 2102; dry gravelly limestone barrens, Eastern Point, St. John Bay, July 26, 1929, *Fernald, Long & Fogg*, no. 2103; dry peaty and turfy limestone barrens, Gargamelle Cove, Ingornachoix Bay, July 20, 1929, *Fernald, Long & Fogg*, no. 2099 (less characteristic, with larger leaves and usually more heads with slightly looser outer bracts than the other nos.). See p. 54.

Antennaria Foggii, with which it is a great pleasure to associate the

name of one of my former students and Mr. Long's and my stimulating, untiring and always companionable associate on two Newfoundland trips, John Milton Fogg, Jr., is unique among the species of eastern America in having the bracts of the viscid or glutinous green lower half of the involucre so closely coherent as to give the involucre (at least when fresh) an almost gamophyllous aspect. In its very large involucre, with broad, oblong bract-tips, *A. Foggii* is suggestive of *A. cana* Fernald, another Newfoundland endemic, and *A. pygmaea* Fernald, of northern Labrador and Baffin Island. In both those species, however, the outer bracts are looser. In *A. cana* the flowering stems are lower, with fewer leaves, the involucral bracts narrower and the corolla shorter; in *A. pygmaea* the mats are at most 5 cm. broad, the basal leaves narrowly oblanceolate, glabrous and mucronate; the upper cauline with a broad-lanceolate to deltoid tip, the 1 or 2 heads with regularly imbricated involucre and corollas only 4 mm. long.

4. *Antennaria **Bayardi*** sp. nov. (tab. 265), humifusa, caulibus repentibus stragula 0.3–1.3 dm. diametro formantibus: stolonibus foliosis ad 3.5 cm. longis; foliis basilaribus cuneato-obovatis subrhomboideis apice subacutis vix mucronatis 5–10 mm. longis 2–5 mm. latis albido-tomentosis, tomento minuto pannoso deinde sublucido; caule florifero gracile 0.3–1.5 dm. alto floccoso-tomentoso; foliis caulinis 6–9 remotis lineari-oblongis laxe tomentosis, imis obtusis, mediis 0.9–1.4 cm. longis 1.5–3 mm. latis subacutis breviter mucronatis, superioribus 2–3 apice lanceolato-subulato scarioso plus minusve unguiculato 0.6–1.5 mm. longo munitis; capitulis femineis (1–) 3–6 corymbosis subcylindrico-urceolatis (in statu exsiccato subturbinatis), pedunculis plus minusve inaequalibus; involucro 6–7 mm. alto basi lanato; bracteis 20–25 3-seriatis valde inaequalibus, anguste oblongis, exteriorum basi viridiscentibus vel obscure brunneis apicibus sordidis vel fulvis vel pallide fuscis 1.2–2 mm. latis, interioribus angustioribus acuminatis; corolla 4–4.8 mm. longa apice purpurascente vel pallida; stylo incluso vel vix exserto integro vel subintegro; achaeniis 1.1–1.4 mm. longis hirtellis; planta mascula ignota.—Newfoundland: dry humus over limestone ledges and shingle, Hannah's Head, Lower Humber Valley, July 12, 1929, *Fernald, Long & Fogg*, no. 2095; shelves of limestone cliff, Druid's (or Raglan) Head, Middle Arm, Bay of Islands, July 16, 1929, *Fernald, Long & Fogg*, no. 2096; limestone cliffs and talus, Tucker's Head, Main Arm, Bonne Bay, August 12, 1929, *Fernald, Long & Fogg*, no. 2097 (type in Gray Herb.). See pp. 48, 83.

A. Bayardi, one of the most distinctive species of eastern North America, is named in appreciation of the loyal companionship and

keen instinct for the finer details of accurate botanical exploration of my companion on many Newfoundland cliffs and barrens, Bayard Long.

A. Bayardi is not closely related to any other small-leaved species of Newfoundland. In its hirtellous achenes it is almost unique, in this character agreeing with *A. isolepis* Greene of the northern half of the Labrador Peninsula and *A. subviscosa* Fernald of Rimouski and Gaspé Counties, Quebec. From both these it is quickly distinguished by its short and broad rosette-leaves; from *A. isolepis* by the blunt tips of the rosette-leaves, the short-mucronate tips of the median cauline and the delicate subulus of the upper cauline leaves (the rosette-leaves of *A. isolepis* being distinctly mucronate, and all but the lowermost cauline bearing broad flat appendages); from *A. subviscosa* by the closer tomentum of the rosette-leaves, shorter, broader and blunter cauline leaves, essential lack of glandularity and dark involucres (*A. subviscosa* having the basal leaves loosely tomentose, the median and upper cauline linear-attenuate and glandular-hirsute, and the glandular-viscid involucres cream-colored or buff to rose-tinged). *A. Bayardi* is also closely related to *A. intermedia* (Rosenv.) Porsild, of western Greenland, and *A. umbrinella* Rydb., of the Rocky Mountains. Both these species, however, have the pubescence of the basal leaves looser, the corymbs more symmetrical, the scarious tips of the involucral bracts broader and more rounded, and the achenes quite glabrous; furthermore the basal leaves of *A. intermedia* are much narrower and sharper-pointed.

All of these localized endemics (*A. intermedia* of nunataks of western Greenland, *A. isolepis* of the unglaciated area of northern Labrador, *A. Bayardi* of the unglaciated mountains of western Newfoundland, *A. subviscosa* of vertical nunatak-cliffs of Rimouski and Gaspé Counties, Quebec, and *A. umbrinella* of the Rocky Mts.) are obviously closely related; and they all have the simple to but slightly cleft style included or barely exserted, the other dwarf species of Newfoundland having the style definitely exserted and finally deeply cleft.

In publishing *A. umbrinella*, Rydberg said: "I describe this species as new, with some hesitation, not that I have any doubt concerning its distinctness from *A. alpina* and our North American species, but it is so closely similar to *A. Magellanica* Sch. Bip. that if it were not for the great distance between their ranges and for the slightly longer leaves and more slender caudex of the latter, I would regard the two

as one species,"[1] *A. magellanica* Sch. Bip. Flora, xxxviii. 117 (1855), with "achaeniis . . . sparse hirtis," was based upon Lechler's no. 1049a from "Sandy Point" (Punta Arenas) on the Straits of Magellan and an excellent sheet in the Gray Herbarium of this type-collection is well matched by a later collection from the Straits of Magellan by Cunningham. In publishing *A. magellanica*, Schultz Bipontinus suggested that it was very close to *A. chilensis* Remy. *A. chilensis* Remy in C. Gay, Fl. Chil. iv. 235 (1849) was from an undesignated province, presumably from the Straits. A beautiful sheet in the Gray Herbarium of this original collection of *A. chilensis*, showing 4 plants with 6 flowering stems in full anthesis, indicates that *A. magellanica* (1855) should be united with *A. chilensis* (1849). Although very similar to several North American plants, *A. chilensis* is not well matched by any of them. It has narrowly spatulate basal leaves 1–2 cm. long, 2.5–4 mm. wide, rounded at apex or obtuse and densely lanate above; the 7–9 linear or linear-oblanceolate cauline leaves 1.5–2 mm. broad, quite lanate and mucronate; the corymbs glomeruliform; the involucres only 5 mm. high, with very unequal creamy to slightly brownish, obtuse, oblong bracts in 3 series. *A. chilensis* is perhaps more nearly simulated by *A. straminea* Fernald, of Newfoundland, than by any other North American species. *A. straminea*, however, has shorter and broader basal leaves, with more pannose tomentum; narrower cauline leaves, the upper with dilated appendages; and even more imbricated involucres (of about 5 series).

The close relationship of the single endemic Patagonian species, *A. chilensis*, with the very extensive series of localized species of cordilleran North America, Greenland, northern Labrador, western Newfoundland and the Gaspé region is of peculiar significance in view of the relationships between these (or some of these) areas repeatedly pointed out in other groups: *Carex macloviana* D'Urv. of Chile, northwestern North America, Gaspé, Labrador, Greenland and arctic Europe, with very numerous endemic allies in cordilleran North America; *Empetrum rubrum* Vahl of subantarctic islands and the Andes of Chile, with its nearest allies two species centering on the Gulf of St. Lawrence;[2] *Primula decipiens* Duby (*P.* "*magellanica*") of the Falkland Islands and Patagonia, the only representative in the southern hemisphere of the complex boreal *Primula* § *Farinosae*;[3]

[1] Rydberg, Bull. Torr. Bot. Cl. xxiv. 302 (1897).

[2] See Fernald & Wiegand, Rhodora, xv. 213–217 (1913); Fernald, ibid, xxvi. 93 (1924); Fernald, Mem. Am. Acad. xv. 261, 262 (1925).

[3] See Fernald, Rhodora, xxx. 74–77 (1928).

Polystichum mohrioides (Bory) Presl of the subantarctic islands and Fuegia, with more or less separable geographic varieties in the Andes, in the cordilleran region of North America and on the Gaspé Peninsula;[1] and many other species, some with numerous localized boreal endemic allies, others, like *Carex capitata* L., *C. incurva* Lightf., *C. microglochin* Wahlenb., *Draba magellanica* Lam., *Plantago juncoides* Lam., etc., etc., with little if any recognized differentiation in the remote areas.

5. *Antennaria **brunnescens**, sp. nov. (tab. 266), humifusa, caulibus ramosissimis repentibus stragula 0.3–1.8 dm. diametro formantibus; stolonibus foliosis ad 2 cm. longis; foliis basilaribus spathulatis vel anguste cuneato-obovatis apice brevissime mucronatis 5–14 mm. longis 2–4 mm. latis supra albidis, tomento denso minuto; caule florifero 5–14 cm. alto floccoso-tomentoso; foliis caulinis 8–14, subdistantibus linearibus strictis glabratis, imis obtusis, mediis 1–1.5 cm. longis 1–1.7 mm. latis acutis apice subulatis, superioribus 4–5 apice scarioso lanceolato vel anguste oblongo plano 2–3.5 mm. longo munitis; capitulis femineis 1–4 cylindrico-campanulatis (in statu exsiccato turbinatis) corymbosis; involucro 7.5–9 mm. alto basi lanato; bracteis 25–35 3-seriatis valde inaequalibus tenuibus oblongo-lanceolatis subacutis, exterioribus badiis 2–2.5 mm. latis) interioribus brunnescentibus lacerato-erosis; corolla 4.8–5 mm. longa apice purpurascente; stylo exserto bifido purpurascente; achaeniis 1.8 mm. longis glabris; planta mascula ignota.—Newfoundland: turfy limestone crest (alt. 650 m.) Killdevil, Main Arm of Bonne Bay, August 23, 1929, *Fernald, Long & Fogg*, no. 2105. See p. 89.

In its very large heads with strongly unequal series of bracts *A. brunnescens* resembles *A. borealis* Greene of Alaska and *A. fusca* Elias Nelson of the mountains of Wyoming. From them both it is at once distinguished by its acutish and brown rather than obtuse and lead-colored bracts and by its narrower cauline leaves with more slender appendages. In *A. fusca*, furthermore, the rosette-leaves are much broader, the cauline leaves much longer, and the corollas pale- instead of purple-tipped. In eastern North America the only small-leaved and dark-headed species which approaches *A. brunnescens* in size of involucre (7.5–9 mm. high), length of corolla (4.8–5 mm.) and length of achene (1.8 mm.) is *A. Foggii* described above; but the involucre of that species, with the bases of the subequal bracts green and agglutinated to simulate a gamophyllous cup, is wholly different from that of *A. brunnescens*, in which the short outer series is castaneous at base and quite free.

[1] See Fernald, Rhodora, xxvi. 89–93 (1924).

6. A. CANA (Fernald & Wieg.) Fernald, RHODORA, xviii. 236 (1916), as to type-specimen (Pointe Riche, Newfoundland, *Fernald & Wiegand* no. 4139), not as to other specimens cited, and as to description only in part; Fernald, RHODORA, xxvi. 98, only in part and not including t. 142, fig. 3 (1924). *A. alpina*, var. *cana* Fernald & Wiegand, RHODORA, xiii. 24 (1911) as to type-specimen cited. PLATE 267.

Antennaria alpina, var. *cana* Fernald & Wiegand (1911) was a hopeless medley, published before the northern Antennarias of eastern America had begun to be properly studied. Its cited specimens belong to several species now clearly differentiated; but the TYPE from Pointe Riche (*Fernald & Wiegand*, no. 4139), having been definitely designated, must settle the final application of the name. When I elevated the variety to specific rank, restricting it to plants of western Newfoundland, I retained in it the two original Newfoundland elements: the TYPE, from Pointe Riche and the plant of Table Mountain, Port au Port Bay (*Fernald & Wiegand*, no. 4141), supplemented by later collections from the latter locality. Subsequent collections brought in much material like that from Table Mountain and gradually I came to think of and to recognize this plant as *A. cana* and under this name I have distributed much material. A much more local plant than the one I have generally been calling *A. cana* was collected along the Straits of Belle Isle in 1925 and, since it was so wholly distinct from that and all other recognized species of the genus, it was published as *A. Longii* Fernald, RHODORA, xxviii. 237 (1926). During the past summer both these plants were found in abundance on Pointe Riche and in its vicinity and I am chagrined to find that the Pointe Riche TYPE of *A. cana* is exactly *A. Longii* and not the much commoner plant (originally cited only from Table Mountain) which has been passing as *A. cana*.[1] *A. cana*, as now restricted, was accurately described as *A. Longii* Fernald, l. c. (1926). It is much more localized than the plant which has been confused with it. PLATE 267 shows characteristic material from the type locality of *A. cana* (at left) and also some of the type material of *A. Longii* (at right).

The material now at hand shows true A. CANA (*A. Longii*) from the following stations, all in northwestern Newfoundland: dry limestone gravel on barrens, Schooner (or Brandy) Island, Pistolet Bay, *Pease*

[1] This lamentable psychological error arose through the shortsighted practise followed in our first two seasons' work in Newfoundland, of labeling all material as collected by *Fernald & Wiegand*, regardless of whether both of us had been the actual collectors. I was at Blanc Sablon while Wiegand was at Pointe Riche, but we collected together on Table Mountain. Thus the Table Mountain plant long stood in my mind as *A. cana*, although the Pointe Riche plant had been designated as the type.

& Long, no. 29,177 (TYPE of *A. Longii*); Cape Norman, *Wiegand & Long*, nos. 29,180, 29,181; Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,178; Four-Mile Cove, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,179; back of Crow's Head, St. John Bay, *Fernald, Long & Fogg*, no. 2086; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2089; Pointe Riche, *Fernald & Wiegand*, no. 4139 (TYPE), *Fernald, Long & Fogg*, no. 2087; dry upper diorite rock-crests at about 750 m. alt., Lookout Mountain, Bonne Bay, *Fernald, Long & Fogg*, no. 2104 (material over-ripe, only doubtfully referred here). Species endemic in Newfoundland.[1]

The commoner plant which has erroneously passed as *A. cana* and which was illustrated as that species in Fernald, RHODORA, XXVI. t. 142, fig. 3, is described below as no. 8.

7. A. VEXILLIFERA Fernald, RHORORA, XXVI. 99, t. 142, fig. 4 (1924). —Local on dry gravelly limestone barrens, Pistolet Bay to St. John Bay: Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,171; Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,172; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2085. Otherwise known only from the Shickshock Mts. of the Gaspé Peninsula.

8. ANTENNARIA **confusa**, sp. nov. (TAB. 268, plant at left), humifusa, caulibus ramosissimis repentibus stragula 0.2–10 cm. diametro formantibus; stolonibus foliosis confertis perbrevibus (ad 2 cm. longis); foliis basilaribus oblanceolatis vel anguste cuneato-obovatis apice obtusis vel subacutis vix mucronatis 3–11 mm. longis 1–5 mm. latis supra albidis, tomento denso minuto; caule florifero 0.3–1.8 dm. alto floccoso-tomentoso; foliis caulinis 8–15 subapproximatis deinde subdistantibus linearibus, imis obtusis, mediis 8–15 mm. longis 1–2 mm. latis strictis acutis apice subulatis, superioribus 3–4 apice scarioso lanceolato- vel lineari-involuto 2–3 mm. longo munitis; capitulis femineis (1–)2–6 campanulatis corymbosis; involucro 5–6 mm. alto basi subviscido-lanato; bracteis 20–30, 2–3-seriatis subaequalibus tenuissimis, exterioribus anguste oblongis vel oblongo-linearibus obtusis 1–1.7 mm. latis fulvescentibus vel fuscescentibus, interioribus angustioribus acuminatis vel apiculatis erosis; corolla 3–3.8 mm. longa apice purpurascente; stylo purpurascente exserto bifido; achaeniis laevibus 1.5 mm. longis; planta mascula ignota.—NEWFOUNDLAND,

[1] Since the above went into type I have examined a specimen of *Antennaria cana*, collected at 5500 feet alt., Mt. Redfern Valley, northern British Columbia, August 2, 1932, by *Mrs. J. Norman Henry* (no. 309, Herb. Phil. Acad.). Mrs. Henry's material can be separated on no character evident in the single specimen from the smaller-headed individuals of *A. cana* of northwestern Newfoundland. This abundantly demonstrated relationship of the floras of western Newfoundland, the Mingan Islands, Anticosti and Gaspé and of the northern Rocky Mts. is further displayed by Mrs. Henry's discovery in northern British Columbia of *Lesquerella Purshii* (Wats.) Fern., a species heretofore known only from western Newfoundland and Anticosti (see p. 267 and t. 258); and by the finding by Dr. H. M. Raup on an adjacent mountain of northern British Columbia of *Agoseris gaspensis* Fern., previously known only from the Shickshock Mts.

ANTENNARIA BAYARDI, × 1; insert × 2.

in dry gravel or dry humus on limestone ledges and barrens, from Pistolet Bay to Port au Port Bay: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,157; Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 29,159; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,160; Cape Norman, *Wiegand, Griscom & Hotchkiss*, no. 29,158; Boat Harbor, Straits of Belle, *Fernald, Wiegand & Long*, no. 29,162, Big Brook, Straits of Belle Isle, *Pease & Griscom*, no. 29,156; one mile back of Savage Cove, *Fernald & Long*, no. 29,155; Savage Point, Straits of Belle Isle, *Fernald, Wiegand, Pease, Long, Gilbert & Hotchkiss*, no. 29,154 (young, involucres blackish); Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Gilbert*, no. 29,173; Rock Marsh, Flower Cove, *Fernald, Long & Dunbar*, no. 27,144; Brig Bay, *Fernald, Long & Dunbar* no. 27,145; limestone bluff opposite western escarpment of Bard Harbor Hill, *Fernald & Long*, no. 29,163; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,169; back of Crow's Head, St. John Bay, *Fernald, Long & Fogg*, no. 2079; Old Port au Choix, *Fernald, Long & Fogg*, nos. 2078 (TYPE in Gray Herb.), 2082; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2081; Pointe Riche, *Fernald, Long & Fogg*, no. 2080; Hannah's Head, lower Humber Valley, July 12, 1929, *Fernald, Long & Fogg*, no. 2090; tableland, alt. 200–300 m., Table Mountain, Port au Port Bay, *Fernald & Wiegand*, no. 4141 (included in original publication of *A. alpina*, var. *cana*), *Fernald & St. John* in Pl. Exsicc. Gray. no. 290, *Mackenzie & Griscom*, no. 10,467; all but the latest collections erroneously labeled *A. cana* (Fernald & Wiegand) Fernald.

As already pointed out, *A. confusa* is the comparatively common dark-headed dwarf *Antennaria* of the limestone barrens of western Newfoundland, until now passing erroneously as *A. cana*. This confusion arose through the fact that, before it was realized that there are many species of the group in western Newfoundland, the two were united; but since the TYPE of *A. cana* is, unfortunately, inseparable from the plant later called *A. Longii*, the name *A. cana* must be restricted to the latter species (t. 267). A somewhat diagramatic drawing of a small specimen of *A. confusa* was shown in Fernald, RHODORA, XXVI. t. 142, fig. 3, as *A. cana*. *A. confusa* is very quickly distinguished from true *A. cana* (*A. Longii*) by having the basal leaves mostly narrower and not rounded at summit; the flowering stems more slender, taller and more leafy (the stoutish stems of *A. cana* usually 2–5, rarely –9, cm. high and with only 4–8 leaves); the appendages of the upper leaves very slender-tipped (those of *A. cana* broader and blunt); the involucre only 5–6 mm. high (in *A. cana* 7–10 mm. high); and the corollas less than 4 mm. long (in *A. cana* 4–5 mm.).

In its slender habit, small heads and short corolla *A. confusa* is nearest *A. vexillifera* Fernald, Rhodora, xxvi. 99, t. 142, fig. 2 (1924), but that species has only 5–8 cauline leaves, nearly all of them with broad and flat oblong-lanceolate appendages, and larger heads with narrower bracts.

9. A. albicans Fernald, Rhodora, xvi. 197 (1914) and xxvi. 100, t. 145, fig. 6 (1924).—Dry shingly, gravelly or turfy limestone barrens from Pistolet Bay to Port au Port Bay: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,164; Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 29,166; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,165; Ice Point, St. Barbe Bay, *Wiegand, Gilbert & Hotchkiss*, no. 29,161; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2083; Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 2084; Table Mountain, Port au Port Bay, *Fernald, & St. John*, no. 10,869 (type). Endemic in Newfoundland.

10. A. straminea Fernald, Rhodora, xvi. 130 (1914) and xxvi. 100, t. 145, fig. 8 (1924).—Dry shingly, gravelly or peaty limestone barrens, Pistolet Bay to Bay St. George; turfy and rocky crests, Notre Dame Bay: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,168; Shoal Cove, Straits of Belle Isle, *Pease & Griscom*, no. 29,176; Savage Point, Straits of Belle Isle, *Fernald, Wiegand, Pease, Long, Gilbert & Hotchkiss*, no. 29,175; Ice Point, St. Barbe Bay, *Wiegand, Gilbert & Hotchkiss*, no. 29,167; Brig Bay, *Fernald, Long & Dunbar*, no. 27,187; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,170; Old Port au Choix, *Fernald, Long & Fogg*, no. 2091; Pointe Riche, *Fernald & Wiegand*, no. 4140, *Fernald, Long & Fogg*, nos. 2092, 2093; limestone crest (alt. 650 m.), Killdevil, Main Arm, Bonne Bay, *Fernald, Long & Fogg*, no. 2094; Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,098; Twillingate, *Fernald, Wiegand & Bartram*, no. 6340 (type); without definite locality, "Terre-neuve," 1828 (herb. Shuttleworth, Brit. Mus.). Endemic in Newfoundland.

11. A. Wiegandii Fernald, Rhodora, xxviii. 238 (1926).—Very local, St. John Bay and Bay of Islands: turfy limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,153 (type); turfy and peaty knolls bordering limestone barrens, Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2098; trap ledges and gravel, subalpine southern slope of Lark Mountain, Bay of Islands, *Fernald, Long & Fogg*, no. 463 (distributed as *A. spathulata* "dwarfed subalpine form"). Endemic in Newfoundland. See p. 54.

12. A. spathulata Fernald, Rhodora, xvi. 196 (1914) including var. *continentis* Fernald & St. John in St. John, Bot. Expl. No. Shore Gulf St. Lawr. 55 (1922). *A. canadensis*, var. *spathulata* Fernald, Rhodora, xvi. 132 (1914).—The most widely dispersed species of Newfoundland, occurring chiefly in turf or humus over calcareous or

noncalcareous ledges, shingle or gravel from Pistolet Bay to the Avalon Peninsula and to Bay St. George. The following specimens are before me: South Arm River, Holyrood, August 23, 1894, *Robinson & Schrenk;* Rushy Pond, Exploits Valley, *Fernald, Wiegand & Darlington,* no. 6362 (type); Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss,* nos. 29,182, 29,184; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss,* no. 29,183; Pointe Riche, *Fernald & Wiegand,* no. 4143, *Fernald, Long & Fogg,* nos. 2109, 2110; Table Mountain, Port au Port Bay, *Fernald & St. John,* no. 10,870, *Mackenzie & Griscom,* no. 10,468; Cape St. George, *Mackenzie & Griscom,* no. 11,119. Known also from the mouth of the Natashquan, Sagnenay Co., Quebec, and from Anticosti Island. See p. 54.

13. *Antennaria **gaspensis*** (Fernald), comb. nov. Tab. 268, plant at right. *A. neodioica,* var. *gaspensis* Fernald, Ottawa Nat. xix. 156 (1905).

When I published *A. neodioica,* var. *gaspensis* our understanding of the genus in eastern America was still very rudimentary, and certain characters now found to be very constant and of diagnostic value had not then been noted. My own field-experience with the plant was on the limestones of Percé in 1904 and 1905 and, although Victorin, Rolland, Brunel, Rousseau and others had repeatedly been collecting it at the tip of the Gaspé Peninsula and on Anticosti Island, I had not seen the plant growing since 1905 until 1929, when Messrs. Long, Fogg and I found it on the limestone headlands near the "bottom" (or head, as we should say) of the Middle Arm of Bay of Islands and on similar headlands on Bonne Bay. So very characteristic was the plant with its slenderly subcylindric whitish heads (in the dried condition turbinate) that it did not occur to any of us to associate it with *A. neodioica* Greene, in which the more or less green- or purple-tinged heads are more campanulate or subhemispherical (in the dried condition broadly rounded at base). The Newfoundland material proves to be quite like the type-collection of *A. neodioica,* var. *gaspensis,* and study in the herbarium reinforces our field-impression in Newfoundland that the plant is quite distinct from *A. neodioica.* Briefly the diagnostic characters are as follows:

A. gaspensis. Rosette-leaves oblanceolate or narrowly obovate, 2–5 mm. broad, strongly whitened above: the terminal mucro or subulus only 0.2–0.5 mm. long: subulus of the median cauline leaves prolonged and commonly unguiculate; tips of the 3–5 upper leaves with pale scarious linear-oblong appendages: fresh involucres slenderly cylindric, becoming turbinate in drying, of 25–35 linear-oblong whitish or light-brown bracts: denuded receptacle ovoid, as high as or higher than broad.

A. NEODIOICA. Rosette-leaves broadly oblanceolate to broadly obovate, 2–17 mm. broad, with the green surface obvious through the grayish tomentum (or rarely glabrous); the terminal mucro or subulus 0.5–1 mm. long: subulus of the median cauline leaves usually straight; the upper leaves (except rarely at base of corymb) with slender and prolonged, often curved, subulate tips: fresh involucres campanulate to hemispherical, the dried broadly rounded at base, of 35–50 or more greenish- or purplish-tinged bracts: denuded receptacle a low rounded dome, distinctly broader than high.

On account of its very narrow leaves much material of the narrowest-leaved extreme of *A. neodioica*, var. *attenuata* has been identified and often reported as *A. neodioica*, var. *gaspensis*. True *A. gaspensis*, as shown by the large series now collected, is confined to the limestones at the eastern end of the Gaspé Peninsula and to Anticosti Island and the limestone mountains of western Newfoundland.

The following collections are referred to A. GASPENSIS. NEWFOUNDLAND: turf over limestone talus, Druid's (or Raglan) Head, Middle Arm, Bay of Islands, *Fernald, Long & Fogg*, no. 2106; turfy limestone ledges and talus, eastern dome of Penguin Head, Middle Arm, Bay of Islands, *Fernald, Long & Fogg*, no. 2107; limestone cliffs and talus, Tucker's Head, Main Arm, Bonne Bay, *Fernald, Long, & Fogg*, no. 2108. QUEBEC: talus calcaires, Rivière Vaureal, Anticosti, *Victorin, Rolland & Louis*, no. 21,327; sur les talus calcaires, Riv. à la Patate, Anticosti, *Victorin, Rolland & Louis*, no. 21,332; sur les talus secs aux bords de l'entrée, Riv. des Caps, Anticosti, *Victorin & Rolland*, no. 27,615; Jupiter River, Anticosti, *J. Macoun*, no. 70,448; platières de l'embouchure, Riv. Jupiter, Anticosti, *Victorin & Rolland*, nos. 25,377, 25,383; calcareous cliffs near Cape Rosier, *A. S. Pease*, no. 20,202; sur le rebord de la falaise, "La Vieille," Cap Gaspé, *Victorin, Germain, Brunel & Rousseau*, no. 17,548; turfy crest of sea cliffs, Cape Gaspé, *Pease*, no. 20,204; alluvions caillouteux côté sud du Forillon, au-delà de Grande-Grève, près de l'Anse-à-l'Andien, *Victorin, Rolland, Brunel & Rousseau*, no. 17,549; limestone shingle, Le Coulé, Percé, August 17, 1904, *Collins, Fernald & Pease;* gravelly slopes, Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease;* dry calcareous gravel, Mt. Ste. Anne, Percé, August 18, 1904, *Collins, Fernald & Pease*, also *Collins, Fernald & Pease*, no. 142 (TYPE in Gray Herb.), *Fernald* in Pl. Exsicc. Gray. no. 291, *Victorin, Rolland, Brunel & Rousseau*, no. 17,550. See pp. 51, 83.

14. A. RUPICOLA Fernald, RHODORA, i. 74 (1899). *A. neodioica*, var. *rupicola* Fernald, RHODORA, xvi. 132 (1914).—In Newfoundland known only in the southeastern half of the island, from the Avalon Peninsula to Notre Dame Bay and the Exploits Valley: dry crests and rocky slopes of sandstone and arenaceous slate hills back of Carbonear, *Fernald & Wiegand*, no. 6349; dry cliffs and talus, Tilt Cove, *Fernald, Wiegand & Darlington*, no. 6347; sandstone ledges and talus, Grand

ANTENNARIA BRUNNESCENS, × 1; insert × 2.

ANTENNARIA CANA, × 1; inserts × 2.

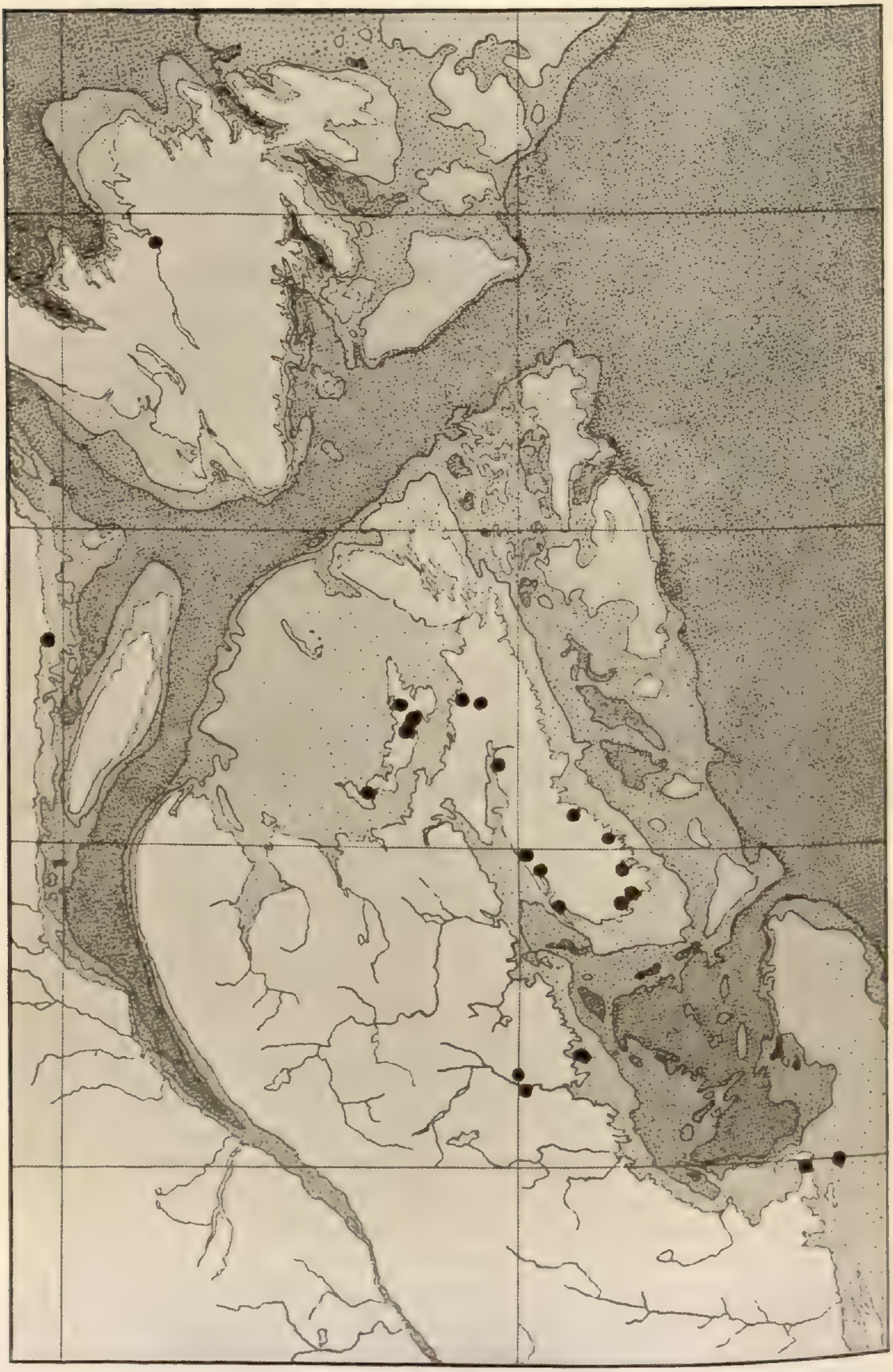
Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 6341–6348; no. 6345 aberrant in having stolons and supernumerary branches developed from the upper axils.

Antennaria rupicola, originally described from Aroostook Co., Maine, was reduced by me to varietal rank in 1914 on the basis of the variable series from along the Exploits at Grand Falls; but material of the plant gradually accumulated from a broad and natural range across southern Canada (MAP 26) is thoroughly consistent, and a re-

Map 26. Range of ANTENNARIA RUPICOLA.

study of it, with the finding of the additional character of the receptacle used in the key, convinces me that it is a well defined northern species.

A. rupicola (MAP 26) ranges from Newfoundland and Anticosti Island to northern Maine, and Thunder Bay District, Ontario. Besides the Newfoundland material (cited above), I have seen the following. QUEBEC: talus calcaires des bords de la Rivière Macdonald, Anticosti, *Victorin, Rolland & Louis*, no. 21,328; sur les cailloutis secs à l'entrée, Riv. Macdonald, *Victorin & Rolland*, no. 27,616; detritus calcaires des talus secs, Riv. du. Rénard, Anticosti, *Victorin & Rolland*, no. 27,614; wooded slope, St. Jean l'Evangéliste, Nouvelle, July 19 & 20, 1904, *Collins & Fernald;* ledgy banks of Restigouche River, Matapedia, July 19, 1904, *Collins & Fernald* (aberrant specimen bearing rosettes and supernumerary branches from the upper axils). MAGDALEN ISLANDS: dry clearing, Grindstone, Grindstone Island, *Fernald, Bartram, Long & St. John*, no. 8175 (distributed as *A. neodioica*). NEW BRUNSWICK: open field, Campbellton, July 8, 1878, *Chalmers* (herb. Brit. Mus.). MAINE: ledgy shores and rocky banks (calcareous-slate ledges), Island Falls, *Fernald*, no. 2361 (TYPE), *Fernald* in Pl. Exsicc. Gray, no. 37, *Pease*, no. 2251. ONTARIO: yellow clay soil along Onaman River, Thunder Bay Distr., 1912, *H. E. Pulling;* rocks, Port Arthur, *C. S. Williamson* (herb. Phil. Acad.). MICHIGAN: Isle Royale, *Cooper*. no. 50.



Map 27. Range of Antennaria petaloidea, var. subcorymbosa.

15. A. NEODIOICA Greene, Pittonia, iii. 184 (1897).—In Newfoundland three varieties may be recognized:[1]

a. Rosette-leaves gray-tomentose above....*b.*
b. Outer and middle bracts of pistillate heads obtuse.....Var. *typica.*
b. Outer and middle bracts attenuate.....Var. *attenuata.*
a. Rosette-leaves bright-green and glabrous above.....Var. *chlorophylla.*

Var. **typica.** *A. neodioida* Greene, l. c.; Fernald, Proc. Bost. Soc. Nat. Hist, xxviii. 244 (1898); Robinson & Fernald in Gray, Man, ed. 7: 822, fig. 982 (1908).—In Newfoundland known only from the southeastern half of the Island: 10 miles south of St. John's, July, 1902, *L. L. Dame;* rocky soil, along Rennie's River, near St. John's, July 12, 1902, *Dame;* rocky clearing, St. John's, *Fernald & Wiegand,* no. 6357; Murray's Pond, 1928, *A. M. Ayre;* dry ledgy slope, Killigrew's, *Fernald & Wiegand,* no. 6358; rocky hills and gravel, ledges and talus along Exploits River, Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* nos. 6359–6361; dry soil, Millertown, July 11, 1930, *Jansson;* rocky river-shore and dry woods, Buchan Junction, July, 1930, *Jansson.* A widely distributed species, from southern Newfoundland to Ontario, south to Virginia, Indiana and Wisconsin.

Var. ATTENUATA Fernald, Proc. Bost. Soc. Nat. Hist. xxviii. 248 (1898).—More general in range: Murrays Pond and Placentia, 1928, *A. M. Ayre;* sandy terraces of Exploits River, Bishop Falls, *Fernald, Wiegand & Darlington,* no. 6356; sandstone ledges and talus, Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* nos. 6350–6355; turfy limestone crest (alt. 650 m.), Killdevil, Main Arm, Bonne Bay, *Fernald, Long & Fogg,* no. 2111; bare spots on peaty and gravelly slopes, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg,* no. 465; dry gravelly slope, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg,* no. 464 (the last two erroneously distributed as var.

[1] Two other well marked varieties are as yet not known from Newfoundland:

Var. GRANDIS Fernald, RHODORA, i. 73 (1899). *A. grandis* House, Bull. N. Y. State Mus. no. 188: 60, 63 (1916), without statement of the specific characters. The largest extreme, with rosette-leaves 7–17 mm. broad; cauline leaves 7–14, mostly broader and longer than in the other vars.; bracts of the involucres (except in forms from deep shade) reddish below, white-petaloid above: corolla and style 5.5–6.2 mm. long.—Nova Scotia and southern New Brunswick to southern Quebec and Michigan, south to Massachusetts and New York.

Var. **interjecta,** var. nov., caulibus humifusis repentibus rigidis subligneis; foliis basilaribus rosulatis oblanceolatis vel anguste obovatis acutis vel subacutis basi subcuneatis supra griseis 3–7 mm. latis; caule florifero erecto vix flexuoso 0.5–2.5 dm. alto; foliis caulinis 8–14 subapproximatis vel vix distantibus; corymbis subglomerulatis globosis vel hemisphericis 1.5–3 cm. diametro; involucri bracteis scariosis linearibus vel lineari-lanceolatis attenuatis stramineis vel albido-virescentibus.—Gaspé and Rimouski Counties, QUEBEC: dry gravelly woods, banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald;* dry fir woods at base of limestone-conglomerate cliffs, west of Baptiste Michaud's, Bic, Rimouski Co., July 16, 1904, *Collins & Fernald* (TYPE in Gray Herb.); sandy field, Anse aux Bouleaux, Bic, *Fernald & Collins,* no. 777; newly seeded field, 1½ miles west of village, Bic, June 22, 1905, *F. F. Forbes;* dry hillside north of Bic, June 23, 1905, *Forbes;* dry bank by Anse Orignal, Bic, June 27, 1905, *Forbes;* sur les schistes dénudés, Pointe du Vieux Bic, *Rousseau,* nos. 26,454, 26,639: sur les schistes, Cap à l'Orignal, Bic, *Rousseau,* no. 26,706; sur les schistes dénudés, Ile du Bic, *Rousseau,* no. 26,848.

Var. *interjecta* has the habit of *A. rupicola,* and the narrow and scarcely petioled, acute rosette-leaves, the numerous and scarcely distant cauline leaves, and the dense subglomerulate corymb of that species; but its scarious involucral bracts are like those of *A. neodioica,* var. *attenuata* and its receptacles have the large and deep pits of *A. neodioica.*

gaspensis); dry exposed calcareous cliffs, Steady Brook Falls, lower Humber River, *Fernald & Wiegand*, no. 4142. The variety has a broad range similar to that of var. *typica*. See p. 89.

*Var. CHLOROPHYLLA Fernald, RHODORA, xxiii. 296 (1922).—Local: rocky river-shore, Buchan Junction, *Jansson;* dry gravelly slope, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg*, no. 462 (erroneously distributed as *A. spathulata*); St. George's, *Mackenzie & Griscom*, no. 11,142.

Var. *chlorophylla* ranges from western Newfoundland and Antocosti Island to Nova Scotia, New England and New York.

16. A. PETALOIDEA Fernald, var. SUBCORYMBOSA Fernald, RHODORA, xvi. 133 (1914). *A. neglecta*, var. *subcorymbosa* Fernald, Proc. Bost. Soc. Nat. Hist. xxviii. 246 (1898).—Very rare in Newfoundland: sandy terraces of Exploits River, Bishop Falls, *Fernald, Wiegand & Darlington*, no. 6363. A coastwise variety (MAP 27) of the more widely ranging *A. petaloidea*, occurring from east-central Newfoundland, the lower Natashquan (Saguenay Co., Quebec), Prince Edward Island and Nova Scotia to Nantucket Island and Cape Cod, Massachusetts.

*HELIANTHUS GIGANTEUS L., var. SUBTUBEROSUS (Bourgeau) Britton. A few plants with obvious weeds on a pastured slope, Lark Harbor, BAY OF ISLANDS, *Fernald, Long & Fogg*, no. 470.

This plant of the north central United States and adjacent Canada is becoming a frequent weed in the East.

ARTEMISIA BOREALIS Pall.

As pointed out in RHODORA, xxix. 93 (1927) we have three varieties of *Artemesia borealis* in Newfoundland. They are, apparently, confined to the West Coast.

A. BOREALIS (typical). BONNE BAY: talus of limestone cliffs near Stanleyville, *Fernald, Long & Fogg*, no. 2121. PORT AU PORT BAY: dry limestone barrens, Table Mt., *Fernald, Wiegand & Kittredge*, no. 4164.

A. BOREALIS, var. PURSHII Besser. ST. JOHN BAY: dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,203. PORT AU PORT BAY: dry exposed ledges and shingle on the limestone tableland, Table Mt., *Fernald & St. John*, no. 10,871, *Mackenzie & Griscom*, no. 10,476. CAPE ST. GEORGE: limestone barrens, Green Gardens, *Mackenzie & Griscom*, no. 11,079.

A. BOREALIS, var. LATISECTA Fern. l. c. (1927). BONNE BAY: shelves and talus of diorite cliffs, Western Head, *Fernald, Long & Fogg*, no. 2122. BAY OF ISLANDS: talus of sea-cliffs, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 476 (TYPE); turfy spots on slaty calcareous talus, Cutwater Head, no. 2120. See p. 7.

(To be continued.)

ANTENNARIA CONFUSA (left), × 1; A. GASPENSIS (right), × 1; inserts × 2.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 346*)

Arnica tomentosa J. M. Macoun, Pittonia, iv. 168 (1900). *A. pulchella* Fern. Rhodora, xvii. 18 (1915), xxvi. 104, t. 143, fig. 2 (1924). St. John Bay: peaty and turfy margins of dry limestone

barrens, Old Port au Choix, *Fernald, Long & Fogg*, nos. 2127, 2128; turfy margins of gravelly limestone barrens, Eastern Point, no. 2129. PLATE 269, FIGS. 3–5.

The Newfoundland plants are mostly much larger than the Rocky Mt. specimens (just as are those of *A. Louiseana*), but I am unable to find any morphological detail to separate them. The species is well named, the very white-tomentose stems, involucres and erect basal leaves shining in the sunlight like white silver. The plants about St. John Bay are excessively tomentose, but the series shows such transition to the plant of Table Mt., Port au Port Bay, described as *A. pulchella*, that it is necessary to reduce *A. pulchella* to *A. tomentosa*. The disruption of range of this species is strikingly like that of *A. chionapappa* Fern. (MAP 29) and of *A. Louiseana* (MAP 30). See p. 53.

*A. PLANTAGINEA Pursh. PISTOLET BAY and HA-HA BAY: turfy limestone barrens, Cape Norman, *Wiegand, Griscom & Hotchkiss*, nos. 29,213; mossy talus of diorite cliffs, Ha-Ha Mt., *Fernald & Long*, no. 29,215.

Arnica plantaginea, heretofore recorded only from the northern part of the Labrador Peninsula, was collected in northern Newfoundland in 1925, the material then misidentified and reported as *A. pulchella* Fern.

A. TERRAE-NOVAE Fern. RHODORA, XXVII. 90 (1925). PLATE 270, FIGS. 3 and 4.

Arnica terrae-novae proves to be more generally distributed on calcareous rocks and gravels of western Newfoundland than at first supposed (see p. 53). Furthermore, the beautifully prepared material, brought back from northern Labrador by Mr. Ernst C. Abbe of the Grenfell-Forbes Northern Labrador Expedition of 1931, supplementing that secured by Dr. R. H. Woodworth, shows that the Labrador plant which has erroneously passed as *A. alpina* (L.) Olin is *A. terrae-novae* (MAP 28); and Mr. Abbe and I find that *A. terrae-novae* extends to the west of Hudson Bay. From true *A. alpina* of subarctic Europe *A. terrae-novae* is at once distinguished by its much narrower basal leaves, its usually less scapose habit, and less lacerate ligules. *A. terrae-novae* is as nearly related to *A. attenuata* Greene, of northwestern America, as to the Scandinavian *A. alpina*. *A. attenuata* is of more delicate texture (drying paler-green), with usually more branching stems, and its basal leaves are clearly 5-nerved, with 2 outer less conspicuous nerves, the basal leaves of *A. terrae-novae* being clearly 3-nerved, sometimes with 2 faint laterals. In *A. terrae-novae* glandular

hairs abound at the summit of the peduncle and at the base of the involucre; in *A. attenuata* they are absent or completely hidden in the dense tomentum. No mature fruits of *A. attenuata* are available, but the flowering material suggests longer achenes and longer pappus.

The following belong to A. TERRAE-NOVAE. LABRADOR: Ekortiarsuk, Cape Chudleigh, *C. S. Schmitt*, no. 312; on sandy old sea bottom, Head of Ryan's Bay, *Woodworth*, no. 428; on granitic rock, old sea beaches, Northwest Bank at Head of Ryan's Bay, *Woodworth*, no. 430; moist meadowy hillsides, Near Island, Seven Islands Bay, Kangalaksiorvik, *Abbe*, no. 572; 20 miles north of Nachvak, August 28, 1908, *H. S. Forbes;* moist gully in cliff on north side of Razorback Harbor, *Abbe*, no. 573; on granite cliffs at 150–600 m., Head of Nach-

Map 28. Range of ARNICA TERRAE-NOVAE.

vak Bay, *Woodworth*, no. 429; slaty talus slope, Rowsell Harbor, *Abbe*, nos. 570, 571; prope Hebron (as *A. angustifolia* Vahl), *Mentzel;* Hebron, August 4, 1908, *H. S. Forbes*. UNGAVA: Mosquito Bay, *A. P. Low*, Herb. Geol. Surv. Can. no. 23,019. NEWFOUNDLAND: turfy limestone barrens, Burnt Cape, Pistolet Bay, *Fernald et al.*, nos. 29,209, 29,210½; turfy limestone barrens, Cook Point, *Fernald & Gilbert*, no. 29,214; limestone barrens, one mile back of Savage Cove, Straits of Belle Isle, *Fernald & Long*, no. 29,207, *Fernald, Pease & Long*, no. 29,208; turfy and peaty margins of dry limestone barrens, Old Port au Choix, Eastern Point, Port au Choix and Gargamelle Cove, *Fernald, Long & Fogg*, nos. 2123–2126; limestone barrens, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,039 (TYPE). MANITOBA: Kettle Rapids, July 15, 1917, *J. H. Emerton*. KEEWATIN: Maguse Lake, *W. C. Gussow*, no. 44 (seen since map 28 was engraved).

ARNICA CHIONOPAPPA Fern. RHODORA, vii. 148 (1905), xxvi. 105, t. 143, fig. 5 (1924). The commonest Arnica of western Newfoundland,

ARNICA CHIONOPAPPA: FIG. 1, small plant, showing 3-nerved basal leaves, × 1, from Newfoundland; FIG. 2, achene and disk-corolla, × 6, from Newfoundland.

A. TOMENTOSA: FIGS. 3 and 4, small plants, × 1 from Newfoundland; FIG. 5, achene and disk-corolla, × 6, from Newfoundland.

secured at many new stations on Bay of Islands, Bonne Bay, Ingornachoix Bay and St. John Bay. PLATE 269, FIGS. 1 and 2.

Arnica chionopappa, originally described from Gaspé and adjacent northern New Brunswick, is of rather general range about the northern half of the Gulf of St. Lawrence. It is also frequent in Mackenzie and Alberta; and recently Professor F. K. Butters has brought me thoroughly characteristic material from northeastern Minnesota. It is probably of more general occurrence on calcareous areas across Canada (MAP 29). Rydberg, N. Am. Fl. xxxiv. 332 (1927) reduces the Gaspé *A. chionopappa* to *A. arnoglossa* Greene, of the Black Hills; and on the opposite page (333) describes the Newfoundland *A. chionopappa* as a new species, *A. Fernaldii* Rydb. I have before me 15 numbers of the Newfoundland plant, representing all stages from

Map 29. Range of ARNICA CHIONOPAPPA.

bud to ripe fruit, 19 numbers, similarly diverse in state of development, of the Gaspé plant, 3 numbers from Anticosti and 1 from New Brunswick. I am quite unable to detect any constant difference in the series. It is consistently different from the plant of the Black Hills, however (*A. arnoglossa*), in having pilose involucres, all the Black Hills material having them glandular-puberulent and scarcely pilose. The disk-corollas of *A. arnoglossa* are slenderly funnel-form, with exceedingly short pilosity on the tube; those of *A. chionopappa* (including *A. Fernaldii*) goblet-shaped, with the pubescence of the tube much longer than in *A. arnoglossa*. So far as material in the Gray Herbarium shows, *A. arnoglossa* is restricted to the Black Hills. The material from Alberta and Mackenzie, of which Dr. Raup has secured many numbers, seems inseparable from *A. chionopappa*. See pp. 51, 53, 81.

A. LOUISEANA Farr, Ott. Nat. xx. 109 (1906). *A. Griscomi* Fern. RHODORA, XXVI. 105, t. 143, fig. 7 (1924). To the one station heretofore known from Newfoundland add the following from ST. JOHN BAY and INGORNACHOIX BAY: turfy margins of gravelly limestone barrens, and turfy slopes below limestone barrens, Eastern Point, *Fernald, Long & Fogg*, nos. 2139, 2140; dominant on turfy talus of limestone sea-cliffs, Eastern Point, no. 2141; peaty and turfy knolls and banks bordering dry limestone barrens southwest of Port au Choix, no. 2142; turfy terraces and slopes on limestone barrens, Pointe Riche, no. 2143. PLATE 270, FIGS. 1 and 2.

Arnica Louiseana was described by Miss Farr from mountains about Lake Louise in the Canadian Rocky Mts. The original description emphasized the nodding flowering heads: "Heads of flowers 1–3, usually 3, fragrant, 4 cm. broad, borne on long, slender, nodding . . peduncles"; and again "The pale yellow color of the flowers and their drooping tendency distinguish it from other Arnicas of the region." Furthermore, the colored illustration of the original collection made by Miss Farr's associate, Mrs. Schäffer,[1] shows a very small plant with definitely nodding small heads. Consequently, when the Gaspé plant with large erect flowering heads was studied, the highly localized species (*A. Louiseana*) of Lake Louise, more than 2200 miles away, was passed as certainly not to be further considered. Subsequently, three sheets of *A. Louiseana*, including an ISOTYPE of the species, have come to the Gray Herbarium. They all agree with the smaller individuals of *A. Griscomi* in every character; and in all of the 12 individuals under these numbers the flowering and fruiting heads are quite erect! It is surmised that, when Mrs. Schäffer made her drawing, which later influenced Miss Farr's diagnosis, the specimens had twisted or bent so that the peduncles had become curved at summit—one of the commonest mishaps in collecting. This assumed postmorten bending toward the light of the peduncles in the plant drawn by Mrs. Schäffer hardly justifies the very fundamental separation of *A. Louiseana* from *A. Griscomi* in the North American Flora, XXXIV. part 4: 322–325 (1927). There Rydberg includes *A. Louiseana* in his § *Obtusifoliae*, "Heads nodding in anthesis"; while *A. Griscomi* is placed in TWO other sections, §§ *Alpinae* and *Arnoglossae*, with "Heads erect in anthesis."

We saw much of *Arnica Louiseana* about Port au Choix, where it makes extensive carpets (see p. 53). Its very young heads (in young bud) are somewhat nodding but when they expand they are quite

[1] Brown & Schäffer, Alp. Fl. Can. Rky. Mts. plate opp. p. 304 (1907).

erect. This species forms more extensive carpets than the others in Newfoundland, owing to a definitely stoloniferous habit. It has either variously leafy or bracted stems or is acaulescent (those who divide the *Senecioneae* primarily on habit and foliage could recognize a dozen artificial segregates from a single habitat). It varies in stature from 0.5–2.5 dm., with basal leaves 1.5–12 cm. long, and 0.6–3 cm. broad. The flowering branches may have 1–5 heads and these vary from 2.5–5 cm. broad.

The striking disruption of range (MAP 30) shown by *A. Louiscana* is a very frequent one, discussed at length in some other papers.

Map 30. Range of ARNICA LOUISEANA.

*CIRSIUM MUTICUM Michx., forma **lactiflorum**, n. f., floribus lacteis.—NEWFOUNDLAND: talus of limestone cliff opposite Lomond, August 10, 1929, *Fernald, Long & Fogg*, no. 2151.

A considerable colony near the base of the cliff opposite Lomond has milk-white instead of the usual purple flowers.

C. PALUSTRE (L.) Scop. LOWER HUMBER VALLEY: "Railway gravel" near Humbermouth, 1910, *Fernald, Wiegand & Kittredge*, no. 4192; springy glades in spruce woods between Marble Mt. and Humbermouth, *Fernald, Long & Fogg*, no. 2153, *Fernald & Long*, no. 2154.

In 1910 Wiegand and I took *Cirsium palustre* to be an introduction, which we associated with the near-by railway. In 1929, however, the plant appeared like a native element in the wet glades and thickets, sharing them with strictly indigenous plants. See p. 15.

TARAXACUM IN EASTERN AMERICA.—The Dandelions of eastern North America consist of the common weeds, dominant and aggressive species difficult to eradicate and, like the majority of our weeds, brought recently from Europe; and a series of indigenous species which, for the most part, are local and non-aggressive, confined to strictly natural habitats of Labrador, Newfoundland, the Mingan Islands, Anticosti and Gaspé, only very rarely extending westward in

Quebec or southward into the Maritime Provinces and New England. The problem of working out the identities of the native species is difficult. The treatment of the genus by Handel-Mazzetti, *Monographie der Gattung Taraxacum* (1907), conservative, and very detailed for Europe and adjacent Asia, recognizes scores of local species there but, exclusive of the very distinct *T. mexicanum* DC., admits absolutely no endemic North American *Taraxaca* and, outside the two introduced species, cites for all temperate and boreal North America only 89 collections. As a sound basis for orientation Handel-Mazzetti's work is invaluable, but for detailed understanding of the genus in North America it is, obviously, unsatisfactory.

The only special study of the genus in North America is Sherff's *North American Species of Taraxacum*.[1] This paper was based upon study of much borrowed herbarium material; but, apparently, the author had had little, if any, intimate field-experience with native American *Taraxaca*. It is difficult for one who has watched, collected and studied the native species of Gaspé, western Newfoundland and Labrador through a period of thirty years to reach the conclusion of Sherff, that *T. lapponicum* Kihlm., with involucral bracts unappendaged and with the achenes (PLATE 271, FIG. 10) muricate only at the summit, is identical with *T. ceratophorum* (Ledeb.) DC. (PLATE 271, FIGS. 1–4), which has corniculate-appendaged bracts and the achenes muricate their whole length. Only by "lumping" very dissimilar plants as an "Herba valde polymorpha," to use Sherff's first descriptive phrase, could such a conclusion be reached. If *T. lapponicum*, *T. lacerum* Greene and *T. ceratophorum* are identical, the question naturally arises, why are not they further merged with *T. lyratum* (Ledeb.) DC.? The character relied upon in Sherff's key to distinguish *T. lyratum* ("Achaenia matura nigrescentia") is, to be sure, one upon which Handel-Mazzetti had placed confidence, but it is most difficult to find any emphatic color-difference in the achenes of *T. lyratum* and of *T. phymatocarpum* Vahl (which Sherff, unjustifiably, it seems to me, merges with it) and in those of many mature collections of *T. lapponicum* and other species which Sherff merges with *T. ceratophorum*. In *T. lyratum*, however, the slender achene (PLATE 272, FIG. 4) is very finely muriculate only at summit; in *T. phymatocarpum* (PLATE 272, FIGS. 1–3) the stouter achene is coarsely muricate its whole length. I am, therefore, after collecting (or being associated

[1] Sherff, Bot. Gaz. lxx. 329–359, plates 31–33 (1920).

ARNICA LOUISEANA: FIG. 1, small plant, × 1, from Newfoundland; FIG. 2, achene and disk-corolla, × 6, from Newfoundland.

A. TERRAE-NOVAE: FIG. 3, small plants, × 1, from Newfoundland; FIG. 4, achene and disk-corolla, × 6, from Newfoundland.

with the collecting of) nearly 150 numbers of indigenous *Taraxaca* and after watching their behavior in the field and observing the essential constancy of their technical characters, quite as unable to follow Sherff in his wholesale reduction of species as I am to subscribe to the wholesale multiplication of micro-species, *formae*, *biotypes* or *jordanons* as "species," at present so much in vogue in northern Europe.

The most fundamental character in *Taraxacum*, it seems to me, is in the mature achene, whether tuberculate its entire length or only at summit, whether with a slender or thick pyramid, and, lastly, whether rufescent or drab. The color is less satisfactory than the other characters, since it often changes as the fruit matures. The length of the filiform beak in mature fruit is, also, a very satisfactory character. Consequently, for really satisfactory study, *ripe fruit* is essential. Much immature or merely flowering material can be placed only approximately. The characters of the involucre are next in importance, whether with many or with few or no bracts corniculate. The leaf-base furnishes important characters. In our introduced species the leaf usually narrows below to a definite petiole; in most of the natives it is broad at base or broadly margined.

On these characters, which seem to be very real, our *Taraxaca* in northeastern America (exclusive of Greenland and the Arctic) seem to fall into 11 species, as follows:

a. Mature achenes mostly tuberculate nearly or quite to the base; the tubercles, at least of the upper half, closely crowded; the surface of the achene without broad and plane intermediate areas....*b.*

b. Beak of achene only 2.5–5 mm. long: involucre blackish, 1–1.4 cm. high, with 10–12 inner bracts: leaves 2–8 cm. long, 3–8 mm. wide, oblanceolate, entire, dentate or sinuate: scapes commonly only 2–9 cm. long.....1. *T. phymatocarpum.*

b. Beak 6–17 mm. long: involucre green, purplish or livid, 1.2–3 cm. high, with 10–25 inner bracts: leaves mostly larger: scapes mostly taller....*c.*

c. Many of the involucral bracts with a conspicuous corniculate appendage or knob below the tip; the outer bracts short and appressed or, if elongate and recurving, definitely broader than the inner.

Inner bracts 1.2–2 cm. long; their tips unappendaged or with appendages rarely if ever much exceeding or overtopping the bract-tips; outer calyculate bracts tightly appressed to and much shorter than the inner, firm, often with a conspicuous white scarious border: beak of fruit 6–14 mm. long.....2. *T. ceratophorum.*

Inner bracts 2–2.6 cm. long; their tips mostly with coarse appendages much longer than and often overtopping the bract-tips; outer calyculate bracts ⅔ as long as the inner, finally loosely spreading or recurving, herbaceous, without broad margin: beak of fruit 13–17 mm. long.....3. *T. laurentianum.*

c. Most or all of the involucral bracts with plane and unappendaged tips; outer bracts thin and herbaceous, when strongly recurving scarcely or but slightly broader than the inner.

All or nearly all the leaves with broad bases; their margins shallowly dentate to sinuate-lobed, the teeth and lobes mostly entire: inner involucre 1.3–2 cm. high, during anthesis with bracts separated to within 1 or 2 mm. of the base; their herbaceous central portion 1–3 mm. wide, with scarious margin 0.2–1. mm. broad at base: achenes pale-brown or reddish, narrowly oblanceolate, 3.8–4.5 mm. long (excluding the pyramid): beak 6–9 mm. long.....4. *T. ambigens.*

All or nearly all the leaves tapering below to slender petioles; their margins with mostly sharply toothed deltoid lobes or teeth: inner involucres 1.5–2.7 cm. high, during anthesis with the bracts united at base for 3–6 mm.; their herbaceous central portion 1.6–4 mm. wide, with white scarious margin 1.3–1.5 mm. broad at base: achenes olivaceous, gray or fuscous, cuneate, 2.8–3.8 mm. long (excluding the pyramid): beak 9–12 mm. long.....5. *T. latilobum.*

a. Mature achenes tuberculate only above the middle or, if occasionally toward the base, the tubercles remote and with broad plane intermediate areas or bands....*d*

d. All or at least many of the involucral bracts corniculate-appendaged....*e.*

e. Achenes grayish, drab, pale-brown or olivaceous; pappus bright white: upper faces of ligules orange-yellow: leaves dentate, shallowly sinuate or deeply lobed.

Leaves linear-oblanceolate, subentire, dentate or sinuate, if sinuate or dissected with mostly entire narrowly deltoid lobes: outer calyculate bracts of involucre closely appressed or barely spreading: pyramid of fruit stout, one-half to quite as broad as long; beak of fruit 5.5–8.5 mm. long.....6. *T. lacerum.*

Leaves narrowly obovate-lanceolate or broadly oblanceolate, deeply sinuate, with the linear-caudate lobes lacerate at the deltoid base and with shorter intermediate narrow lobes: outer calyculate bracts loosely spreading, recurving at maturity: pyramid slender, 3–4 times as long as broad; beak 10–13 mm. long.....7. *T. Longii.*

e. Achenes red or reddish-purple: pappus creamy or sordid: upper faces of ligules sulphur-yellow: leaves mostly dissected nearly or quite to the midrib.....8. *T. laevigatum.*

d. All or nearly all the involucral bracts unappendaged....*f.*

f. Achene subtruncate or strongly rounded below the short pyramid: the upper third of each rib with 4 or more sharp murications; pyramid 0.3–1 mm. long.

Leaves usually narrowed below to a slender scarcely winged petiolar base; at least the lower and longer marginal lobes toothed and with frequent intermediate small teeth: achenes (excluding the slender pyramid) 2–4 mm. long, drab or olivaceous.....9. *T. palustre.*

Leaves mostly broad at base or with broadly winged petiole; marginal lobes entire or with few teeth; intermediate teeth few or none: achenes (excluding pyramid) 3.5–5 mm. long, olivaceous to fulvous...10. *T. lapponicum.*

f. Achenes attenuate into the long pyramid, smooth throughout or with 1–3 murications at the summit of each angle; pyramid 1.5–2 mm. long.....11. *T. torngatense.*

1. *T. PHYMATOCARPUM Vahl in Hornem. Fl. Dan. xiii. fasc. xxxix. 6, t. mmcclxxxxviii. fig. 12 (1860); Handel-Mazzetti, Mon. Gat. Tarax. 58, tt. II. fig. 8 and IV. fig. 12 (1907). *T. lyratum* Sherff, Bot. Gaz. lxx. 332 (1920), in part, not DC. (including t. xxxi. fig. g).—Arctic America and arctic eastern Asia; with us known only from NEWFOUNDLAND: dry limestone crest of northern half of Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,254. See p. 121. PLATE 272, FIGS. 1–3.

Taraxacum phymatocarpum, with the very closely allied, if not inseparable, *T. hyparcticum* and *T. pumilum* Dahlst., is a typical high-arctic plant, characterized by its vary small heads, with black involucre of few bracts, its short and stout, very strongly muricate, fuscous achene and its very short beak. The recent collections from Labrador, made by my students and others under my direction who have made a specialty of collecting *Taraxacum, Arnica, Antennaria, Euphrasia* and other critical genera, contain none of it, though it is to be expected in northernmost Labrador. As already stated, I am unable to follow Sherff in reducing *T. phymatocarpum* to *T. lyratum* (Led.) DC. *T. lyratum* came originally from the region of Behring Straits ("*in lapidosis summae alpis ad. fl. Tschuja contra ostium fl. Tschegan*") and its habit was beautifully shown in Ledebour's plate. Material in the Gray Herbarium from Arakamtchetchene Island (*C. Wright* in Herb. U. S. No. Pacif. Expl. Exped.) is from close by and is quite like Ledebour's original plate. This is the plant of arctic Northwestern America which extends southward as an alpine species to Arizona. Its very distinctive achene is shown in PLATE 272, FIG. 4.

In view of the concentration in the North of *Taraxacum lyratum* and *T. phymatocarpum* and their allies, it is peculiarly notable that the subantarctic species, the so-called § *Taraxaca antarctica* of Handel-Mazzetti (*T. magellanicum* Commerson and *T. melanocarpum* and *T. cygnorum* Handel-Mazzetti) of Chile, South Australia, New Zealand and Chatham Island, should be so close to *T. phymatocarpum*. For comments on this bipolar relationship in *Lesquerella, Antennaria* and in many other groups see pp. 269 and 335.

2. T. CERATOPHORUM (Led.) DC. Prodr. vii[1]. 146 (1838); Handel-Mazzetti, l. c. 62, in large part, t. II. fig. 11 (1907); Sherff, l. c. 338, in small part (1920). *Leontodon ceratophorus* Led. Icon. Pl. Fl. Ross. i. 9, t. 34 (1829). *T. vulgare*, var. *ceratophorum* (Led.) Trautv. Pl. Sib. 76 (1877), name only.—A wide-ranging boreal species, known in

our area only from Labrador, western Newfoundland and southeastern Quebec. Labrador: rock-crevices, Rock Island, 15 miles nw. of Ford Harbor, *Harlow Bishop*, no. 606a; base of cliff, Dead Islands, lat. 52° 48′, *J. A. Allen*, no. 59. Newfoundland: crevices of trap cliffs, Sacred Island, Straits of Belle Isle, *Fernald & Long*, no. 29,239; mossy and turfy trap cliffs and talus, Anse aux Sauvages, Pistolet Bay, *Fernald, Wiegand & Long*, no. 29,240; shelves, crests and talus of diorite cliffs, Ha-Ha Point, *Fernald & Long*, no. 29,238; turfy or gravelly shelves, crests or talus of diorite, Ha-Ha Mountain, *Pease & Griscom*, nos. 29,241, 29,242; springy meadow at base of Ha-Ha Mt., *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,262; turfy limestone barrens, Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,237 (broad-leaved form); sandy and turfy upper border of limestone beach, Cook Point, *Fernald & Gilbert*, no. 29,243 (dwarf form, distributed as *T. groenlandicum*); dripping limestone ledges, Cook Point, *Fernald, Gilbert & Hotchkiss*, no. 29,264; turfy or peaty pockets in limestone ledges, Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 27,171; turfy borders of limestone beach, Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 2172. Quebec: limestone shingle, crest (625 ft.) of Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease;* gravelly banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald;* calcareous cliffs and talus, Gros Morne, Gaspé Co., *Fernald & Weatherby*, no. 2482; summit of talus and bases of calcareous cliffs west of Rivière aux Marsouins, Gaspé Co., *Fernald & Weatherby*, no. 2477; limestone and limestone-conglomerate ridges from Pointe aux Corbeaux to Cap Caribou, Bic, *Fernald & Collins*, no. 1210; rock-crevices, Cap Orignal, Bic, *Fernald & Collins*, no. 792, *Rousseau*, no. 26,708; Pointe sud-ouest du Cap Orignal, Bic, *Rousseau*, nos. 31,004, 31,006. Plate 271, figs. 1–4.

As American *Taraxacum ceratophorum* I have taken the plant which seems nearest to match the highly conventionalized plate of Ledebour. Much material quite unlike it has been thrust into *T. ceratophorum* by Sherff; but, without a more extended study of species proposed by Greene, Rydberg and others in western North America, I am not prepared to state the exact range of *T. ceratophorum* in the West. Good material from the Cascade Range in British Columbia is shown by sheets from Mt. McLean, near Lillooet, July, 1916, *J. M. Macoun*, nos. 98,693 and 98,696; and Dr. Raup has brought back many numbers from northern British Columbia. The most extreme plant related to *T. ceratophorum*, in having copiously tuberculate achenes and conspicuously appendaged involucral bracts, is a species of shores of the Gulf of St. Lawrence which has sometimes been distributed as *T. ceratophorum*, more often as *T. dumetorum* Greene; but, since Greene explicitly states that his *T. dumetorum* has the "achenes

TARAXACUM CERATOPHORUM: FIGS. 1 and 2, small plant and individual head, × 1, from Newfoundland; FIG. 3, achene, with beak and pappus, × 1; FIG. 4, achene, × 10.

T. AMBIGENS: FIG. 5, small leaf, × 1, from the TYPE, Port au Choix, Newfoundland; FIG. 6, head, × 1, from the TYPE; FIG. 7, achene, with beak and pappus, × 1, from the TYPE; FIG. 8, achene, × 10, from the TYPE.

T. AMBIGENS, VAR. FULTIUS: FIG. 9, head, × 1, from the TYPE, Gargamelle Cove, Newfoundland.

T. LAPPONICUM: FIG. 10, achene, × 10, from Newfoundland.

. . . spinulose at summit, otherwise smooth," it is not satisfactory to place the plant of the Gulf of St. Lawrence with it. Some other characters are evident on comparing the Rocky Mountain plant which I take to be *T. dumetorum*. It has a smaller head (the inner involucre 1.5–2 cm., in the Laurentian plant 2–2.6 cm. high; its outer bracts are shorter and very scarious or broadly scarious-margined, the long outer bracts of the Laurentian plant herbaceous. Its achenes (PLATE 272, FIG. 10), as already stated, are smooth below, and its mature beak 7–8 mm. long; the Laurentian plant having the larger mature achenes rough throughout and with beaks 13–17 mm. long. I am therefore proposing the latter as

3. *T. **laurentianum**, sp. nov. (TAB. 272, FIGS. 5–9), planta robusta; foliis oblanceolatis tenuibus 1–3 dm. longis 2–5 cm. latis, basi late marginatis, marginibus duplo dentatis, dentibus longioribus argutis lanceolatis vel anguste deltoideis 0.3–1.3 cm. longis; scapo crasso 1–3.5 dm. alto; capitulis magnis; bracteis exterioribus herbaceis viridibus vel purpurascentibus late lanceolatis vel anguste ovatis 1.5–2 cm. longis 4–8 mm. latis adscendentibus deinde patentibus vel recurvatis apice planis vel valde corniculatis, corniculis bracteae apicem valde superantibus; bracteis interioribus 18–25 lineari-lanceolatis 2–2.6 cm. longis valde corniculatis, corniculis ovatis bracteae apicem majoribus; ligulis croceis dorso fuscis; achaeniis griseo-olivaceis cuneato-oblongis 3.2–4 mm. longis apice acute muricatis basin versus obtuse muriculatis; pyramide subulata 1.2–2 mm. longa; rostro 13–17 mm. longo; pappo 7–10 mm. longo gilvo-lacteo.—Western Newfoundland and eastern Quebec. NEWFOUNDLAND: springy meadow at base of Ha-Ha Mountain, Ha-Ha Bay, July 17, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,245, TYPE in Gray Herb. (distributed as *T. ceratophorum*); turfy spots on slaty calcareous talus, Cutwater Head, Bay of Islands, July 16, 1929, *Fernald, Long & Fogg*, no. 2174; turfy spots on slaty calcareous talus, Cod Cove, Bay of Islands, July 16, 1929, no. 2175. QUEBEC: sur les calcaires, Ile St.-Charles, Archipel de Mingan, 26 juillet 1924, *Victorin & Rolland*, no. 18,396 (as *T. ceratophorum*), 20 juillet 1926, no. 25,181; sur les calcaires du côté sud, Ile à la Chasse, Mingan, 26 juillet 1924, no. 18,397; cailloutis calcaires, Grande Ile à Bouleau, Mingan, 29 juillet 1926, no. 25,178; sur le sable de goulet, Rivière la Loutre (Est), Anticosti, 3 août 1927, *Victorin & Rolland*, no. 27,559. See pp. 50, 51.

Taraxacum laurentianum is the eastern American counterpart of the northern Skandinavian *T. Hjeltii* Dahlst. That, however, has the inner involucre only 1.7–2 cm. long, the outer bracts with white scarious margin, the pyramid at most 0.75 mm. long and the beak at most 1 cm. long. Its relationship to the western American *T. dumetorum* has been noted. The large collections of the latter brought back

from Alberta and British Columbia by Dr. H. M. Raup greatly reinforce my opinion that it is a very definite western American species.[1]

4. *T. **ambigens**, sp. nov. (TAB. 271, FIGS. 5–8), planta subgracilis; foliis oblanceolatis tenuibus 0.3–3 dm. longis 1–3 (–6) cm. latis basi late marginatis, marginibus dentatis vel sinuatis, lobis horizontaliter divergentibus vel refractis triangularibus plerumque integris 0.3–1.5 cm. longis; scapo 0.4–6 dm. alto; capitulis mediocribus; bracteis exterioribus herbaceis lineari-lanceolatis 0.8–1.3 cm. longis 1.5–3 mm. latis, reflexis apice plerumque planis; bracteis interioribus 10–20 lineari-lanceolatis 1.1–1.9 cm. longis apice planis; ligulis croceis; achaeniis pallide brunneis vel rufescentibus anguste oblanceolatis 3.8–4.5 mm. longis apice acute muricatis basin versus obtuse muriculatis; pyramide 0.5–1 mm. longa; rostro 6–9 mm. longo; pappo 5–8 mm. longo lacteo.—Southern Labrador, western Newfoundland and eastern Quebec. LABRADOR: springy banks and damp hillsides, Forteau, July 30, 1910, *Fernald & Wiegand*, no. 4210. NEWFOUNDLAND: swales and wet peaty limestone barrens, Capstan Point, Flower Cove, July 27, 1924, *Fernald, Long & Dunbar*, no. 27,175 (as *T. latilobum*); shaded base of limestone sea-cliff, Port au Choix, July 27, 1929, *Fernald, Long & Fogg*, no. 2167 (TYPE in Gray Herb.); turfy limestone shore, Sandy Cove, Ingornachoix Bay, August 9, 1924, *Fernald, Long & Dunbar*, no. 27,177 (as *T. latilobum*); calcareous cliffs, Steady Brook Falls, lower Humber Valley, July 16, 1910, *Fernald & Wiegand*, no. 4209 (as *T. ceratophorum*). QUEBEC: limestone and calcareous sandstone terraces, Blanc Sablon ("Labrador"), July 30, 1910, *Fernald & Wiegand*, no. 4211 (as *T. ceratophorum*); damp ledges and alluvium, R. Ste. Anne des Monts, August 3–17, 1905, *Collins & Fernald* (as *T. ceratophorum*); wet calcareous ledges, Grand Cascapedia R., July 12–15, 1905, *Williams, Collins & Fernald* (as *T. ceratophorum*).

*Var. **fultius**, var. nov. (TAB. 271, FIG. 9), bracteis exterioribus ovatis vel ovato-lanceolatis 5–8 mm. longis 2.5–4 mm. latis erectis.—NEWFOUNDLAND: turfy limestone slopes east of Big Brook, Straits of Belle Isle, July 16, 1925, *Fernald, Wiegand & Hotchkiss*, no. 29,260 (as *T. ceratophorum*); turfy talus of limestone headland, Gargamelle Cove, Ingornachoix Bay, July 20, 1929, *Fernald, Long & Fogg*, no. 2163 (TYPE in Gray Herb.). QUEBEC: mossy meadows at 455 m. (1500 ft.) to 915 m. (3000 ft.), Fernald Basin, between Mts. Mattaouisse and Fortin, July 22, 1922, *Fernald & Pease*, no. 25,342 (as *T. ceratophorum*, altered to *T. lapponicum*), July 8, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 26,116 (as *T. ceratophorum*, altered to *T. lapponicum*).

[1] Just as this discussion of *Taraxacum* is to be paged, beautiful material of *T. dumetorum* from within the area here covered comes to hand: from shaded cliffs, Northern Slate Island, Thunder Bay District, Ontario, July 6, 1933, *A. S. Pease & R. C. Bean*, no. 23,576. Its characters are discussed in the treatment of *T. ceratophorum*.

Taraxacum ambigens, as clearly indicated in the citations, has been confused with *T. ceratophorum*, *T. lapponicum* and *T. latilobum*. In foliage it is very like the first two and quite unlike *T. latilobum*, which has the slender-petioled leaves copiously double-dentate. The involucre is essentially that of *T. lapponicum* and without the corniculate appendages and the firm and white-bordered outer bracts of *T. ceratophorum;* but the achenes in all mature heads are copiously tuberculate or muriculate to the base, as in both *T. latilobum* (PLATE 273, FIG. 5) and *T. ceratophorum* (PLATE 271, FIG. 4). This series has been a constant source of perplexity, thrown first into one species because of the involucre, then into another because of the leaves and, again, into a third because of the achenes. With *T. ambigens* taken out, the entanglement which has confused the identities of *T. ceratophorum* and *T. lapponicum* in eastern America is removed. That *Taraxacum ambigens* is not a hybrid of *T. lapponicum* and *T. ceratophorum* is quite clear. At only 1 of the 16 stations for the latter has *T. ambigens* been found, although these areas have all been closely scrutinized for all *Taraxaca*. *T. ambigens* may eventually have to be reduced to one of the Cordilleran species of Greene, Rydberg or Nelson. Its strongly muricate achenes seem to keep it apart; but a number of their proposed species were based on very young material of which ripe achenes were unknown.

5. T. LATILOBUM DC. Prodr. vii[1]. 146 (1848). *Leontodon latilobum* (DC.) Britton in Britt. & Brown, Ill. Fl. ed. 2, iii. 315, fig. 4063 (1913).—Newfoundland to New England. NEWFOUNDLAND: without definite locality, 1826, *La Pylaie* in herb. DC. (TYPE), tracing in Gray Herb.; turfy limestone shore, St. Barbe, *Fernald, Long & Dunbar*, no. 27,176; grassland, Old Port au Choix, *Fernald, Long & Fogg*, no. 2159. QUEBEC: calcareous cliffs and talus, Gros Morne, Gaspé Co., *Fernald & Weatherby*, nos. 2479–2481; grès schisteux, Tourelle, *Rousseau*, no. 31,145. MAINE: gravelly thicket, Orono, *Fernald*, no. 2397 (as *T. officinale*); rocky slope, Dennysville, *Fernald & Weatherby*, no. 2483; damp soil, Cutler, July 2, 1902, *Kennedy, Williams, Collins & Fernald.* MASSACHUSETTS: low woodland dump, Beverly Farms, June 23, 1913, *F. T. Hubbard;* Lanesboro, July 17, 1917, *J. R. Churchill.*

Taraxacum latilobum has the aspect of very broad-leaved *T. palustre*, var. *vulgare* (*T. vulgare* (Lam.) Schrank, *T. officinale* Weber) but its achenes (PLATE 273, FIG. 5) are very strongly muriculate quite to the base as in *T. ceratophorum*. The abundantly naturalized European species, to which Handel-Mazzetti and others have referred *T. latilobum* has, as they describe them, the achenes tuberculate at sum-

mit, "parte superiore (¼ usque ½ fere) t u b e r c u l i s l a r g i s brevioribus longioribusve o b s i t a"—*Handel-Mazetti*. *T. latilobum* is apparently indigenous from Newfoundland and Gaspé to central and eastern Maine, but at its Massachusetts stations it seems like an introduction.

6. T. LACERUM Greene, Pittonia, iv. 230 (1901). *T. ceratophorum* Liebm. & Lange, Fl. Dan. xv. fasc. xlv. 7, t. mmdclix. (1861), not DC. *T. mutilum* Greene, l. c. 232 (1901); *T. groenlandicum* Dahlst. Arkiv. Bot. v. no. 9: 23, tt. 14 and 15 (1906). *T. arctogenum* Dahlst. l. c. 26, t. 16 (1906).—Greenland and Arctic America, south to Labrador, northwestern Newfoundland and the Mingan Islands, Quebec, and in the West to the Rocky Mts. in the upper Peace River region. LABRADOR: near mouth of stream emptying into south side of East Bay, Ikordlearsuk, lat. 59° 57′, *Abbe & Odell*, nos. 593, 594; moist meadowy hillside, Near Island, Seven Islands Bay, Kangalaksiorvik, lat. 59° 25′, *Abbe*, no. 595: top of ridge, north of harbor, Razorback Harbor, lat. 59° 14′, *Abbe*, no. 596; moist gully in cliff on north side of Razorback Harbor, *Abbe*, no. 597; gravelly beach, Mouth of Frazer River, lat. 57°, *Harlow Bishop*, no. 606; Nain, *C. S. Sewall*, no. 142; hill back of Mission Park, Hopedale, lat. 55° 27′, *Abbe & Hogg*, no. 592. UNGAVA: Ungava River, *Spreadborough*, no. 14,395 (as *T. ceratophorum*). NEWFOUNDLAND: dry limestone barrens, northern half of Burnt Cape, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,254*a*; dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,266. QUEBEC: sur les calcaires, Ile Quin, Archipel de Mingan, *Victorin & Rolland*, nos. 18,398, 18,399.

Taraxacum lacerum, originally described (in 1901) from the Upper Liard in northern British Columbia, was collected in the same general area (on Mt. Selwyn) in great diversity of numbers by Dr. Hugh M. Raup and his companions in 1932. Dr. Raup's very full material shows every transition to Greene's *T. mutilum* (1901) from Alaska and it is quite inseparable from the Greenland, Labrador and Newfoundland specimens which Dahlstedt has identified as his own *T. groenlandicum* (1906). I am, furthermore, unable to find satisfactory distinctions to separate *T. arctogenum* (1906), a co-type of which is in the Gray Herbarium. Dahlstedt, in publishing *T. groenlandicum*, cited material from Melville Peninsula. It is in the Herbarium of the Carnegie Museum from Southampton Island; and in the Gray Herbarium from Dawson Trail, Yukon (*Tyrrell*, no. 23,101), Herschell Island, Yukon (*Frits Johansen*, no. 98,717) and Point Barrow, Alaska (*Murdock*). The species is, then, widely dispersed in Arctic America,

TARAXACUM PHYMATOCARPUM: FIG. 1, plant, × 1, from Greenland; FIG. 2, achene, with characteristic short beak and remnant of pappus, × 1, from Greenland; FIG. 3, achene, × 10.

T. LYRATUM: FIG. 4, achene, × 10, from Colorado.

T. LAURENTIANUM: FIG. 5, leaf, × 1, from the TYPE, Ha-Ha Bay, Newfoundland; FIGS. 6 and 7, heads, × 1, from the TYPE; FIG. 8, achene, with long beak and long pappus, × 1, from the TYPE; FIG. 9, achene, × 10, from the TYPE.

T. DUMETORUM: FIG. 10, achene, × 10, from Alberta.

with extensions south to the Gulf of St. Lawrence and to the northern Rocky Mts.

7. *T. **Longii**, sp. nov. (TAB. 273, FIGS. 1–4), planta subgracilis; foliis anguste obovato-lanceolatis vel late oblanceolatis valde laciniato-sinuatis 1–1.5 dm. longis 3–5 cm. latis, lobis lineari-caudatis ad basin versus deltoideis laceratis; scapo 0.9–2 dm. longo; capitulis magnis; bracteis exterioribus ovatis vel oblongis purpureo-tinctis 6–10 mm. longis 3–5 mm. latis apice plus minusve corniculatis in calathio erectis deinde laxe patentibus vel recurvantibus; bracteis interioribus 10–12 lanceolatis 1.6–2.4 cm. longis cornubus parvis plerumque praeditis; ligulis croceis; achaeniis griseo-olivaceis vel pallide brunneis oblanceolatis 3.5–4 mm. longis apice acute muricatis basin versus planis; pyramide subulata 1.2–1.5 mm. longa; rostro 1–1.3 cm. longo; pappo 7–8 mm. longo albo.—Northwestern Newfoundland and southeastern Quebec. NEWFOUNDLAND: springy meadow at base of Ha-Ha Mountain, Ha-Ha Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,244, as *T. lacerum* (TYPE in Gray Herb.); turfy crests of limestone ledges, Flower Cove, *Fernald, Long & Dunbar*, no. 27,170 (as *T. lacerum*). QUEBEC: limestone gravel, banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald* (as *T. dumetorum*).

Taraxacum Longii is one of the complex group of which *T. ceratophorum* is the type. From that species, as here interpreted, it differs in its doubly incised-dentate leaves, the recurving, broader and more herbaceous outer bracts, the tiny appendages of the inner bracts and the achenes smooth below the summit. From *T. lacerum*, to which it was previously referred, by its broader and doubly incised leaves and the more herbaceous and soon reflexing outer bracts. From *T. dumetorum* it is at once distinguished by its very characteristic leaf, by the herbaceous (rather than scarious) and more appendaged, shorter outer bracts, by the fewer inner bracts and by the longer pyramid of the fruit. *T. Longii* is related to *T. macroceras* Dahlst. of Siberia, but that has the outer bracts appressed and with much longer horns, the inner narrower than in *T. Longii*, and the fulvous achenes with a very short (0.5 mm. long) pyramid. The only other species to which *T. Longii* seems to approach is *T. norvegicum* Dahlst.; but that has a shorter involucre, with much narrower bracts, the outer appressed, the pyramid short and the beak at most 6 mm. long.

8. T. LAEVIGATUM (Willd.) DC. Cat. Hort. Monspel. 149 (1813); Handel-Mazzetti, l. c. 109, t. III. fig. 11 (1907); Sherff, l. c. 356 (1920). *Leontodon laevigatus* Willd. Sp. Pl. iii. 1546 (1800). *T. erythrospermum* Andrz. in Bess. Enum. 75 (1822); Fernald, Bot. Gaz. xx. 323 (1895). *L. erythrospermum* (Andrz.) Eichw. Naturhist. Skizze Litth. Volhyn. 150 (1830); Britton in Britt. & Brown, Ill. Fl. ed. 2, iii. 316, fig. 4064

(1913).—Dryish open soil, southern Quebec to southern British Columbia, south to Virginia, Missouri and New Mexico (acc. to *Sherff*); naturalized from Europe. First collected in America, apparently, in 1886; now widely dispersed.

9. T. PALUSTRE (Lyons) Lam. & DC. Outer bracts of involucre ovate to oblong-lanceolate, erect, finally loosely spreading.—Fl. Franç. iv. 45 (1805), in part, but including name-bringing synonym, not *T. palustre* (Ehrh.) Dahlst. Bot. Not. 1905: 145 (1905) and Arkiv. Bot. vii. no. 6: 8 (1908). *Leontodon palustre* Lyons, Fasc. Pl. 48 (1763); Sm. Engl. Bot. viii. 553 (1799) and Fl. Brit. ii. 823 (1800). *L. Raji* Goüan, Ill. et Obs. Bot. 55 (1773). *L. Taraxacum*, δ. *palustre* (Lyons) Huds. Fl. Angl. ed. 2, i. 339 (1778). *T. officinale*, β. *palustre* (Lyons) St.-Amans, Fl. Agenaise, 324 (1821); Fernald, RHODORA, iv. 157 (1902). *L. Taraxacum palustris* (Lyons) Gaudin, Fl. Helv. v. 62 (1829). *T. officinarum*, δ. *palustre* (Lyons) Maly, Fl. Deutschl. 241 (1860).—Grasslands, especially damp or wet, or damp slopes, Newfoundland and Quebec to southern New England, rarely to Pennsylvania; naturalized from Europe. The earliest American collections seen were made in Vermont in 1896.

Var. **vulgare** (Lam.), comb. nov. Outer bracts linear or linear-lanceolate, strongly reflexed even in bud.—*Leontodon Taraxacum* L. Sp. Pl. ii. 798 (1753), in part; and many later authors. *L. vulgare* Lam. Fl. Franç. ii. 113 (1778). *T. officinale* Weber ex Wiggers, Prim. Pl. Holst. 56 (1780). *T. vulgare* (Lam.) Schrank, Prim. Fl. Salisburg, 193 (1792); Handel-Mazzetti, l. c. 88, t. III. fig. 2 (1907); Sherff, l. c. 350 (1920). *L. officinalis* (Weber) With. Arr. Brit. Pl. ed. 3, iii. 679 (1796), excl. var. *T. Dens-leonis* Desf. Fl. Ant. ii. 228 (1800). *L. Taraxacum*, δ. *vulgare* (Lam.) Benth. Cat. Pl. Indig. Pyr. Bas Langued. 94 (1826). *T. Dens-leonis*, var. *officinale* (Weber) Coss. & Germ. Fl. Env. Paris, ii. 432 (1845), as to name-bringing synonym. *T. Taraxacum* (L.) Karsten, Deutsch. Fl. 1138 (1880–83).—Grasslands and clearings, a ubiquitous and aggressive weed, Newfoundland to southern Alaska, south through much of the United States; naturalized during colonial days from Europe.

The necessity to reverse the names of our two large olive- or drab-fruited weedy Dandelions, one the ubiquitous weed with the outer bracts narrow and strongly recurved from the first, the other a weed of Newfoundland, eastern Canada and New England (rarely in Pennsylvania) with shorter and broader appressed or merely spreading outer bracts, is most disconcerting. It results, however, from the failure of those who have monographed our *Taraxaca* to trace the names involved to their ultimate sources. It is, to say the least, uncomfortable, in following the rules of Nomenclature now in vogue, to find one's self unwillingly appearing as an iconoclast, in changing to a very awkward combination the technical name of a cosmopolitan weed.

It is certainly to be hoped that a less cumbersome and more appropriate designation may eventually be found.

In the present case Handel-Mazzetti, in his *Monographie der Gattung Taraxacum* (1907), merged, as *T. paludosum* (Scop.) Schlechter (1866), the real *T. paludosum*, i. e. *Hedypnois paludosa* Scop. Fl. Carn. ii. 100, t. 48 (1772) and the wholly different *T. palustre* (Lyons) Lam. & DC. (1805). Handel-Mazzetti cited definitely in the synonymy of *T. paludosum* the *T. palustre* Lam. & DC. (1805), *Leontodon Taraxacum* var. *palustre* With. (1787) and *L. palustre* Smith (1800) and, as a plant intermediate between *T. vulgare* and *T. paludosum*, the *L. Taraxacum*, δ. *palustre* Hudson (1778)—the latter incorrectly cited by Handel-Mazzetti as a binomial ("*L. palustre* Hudson"), which Hudson did not make. Had he checked the citations, he would have detected that the original use of the name *T. palustre* was for a plant utterly unlike *T. paludosum*. Smith (1800), Withering (1787) and Hudson (1778), at the points cited by Handel-Mazzetti, all definitely carried the reference back to "*Lyons. Fasc.* 48"; but the failure of recent monographers to do so has caused the present upheaval in nomenclature.

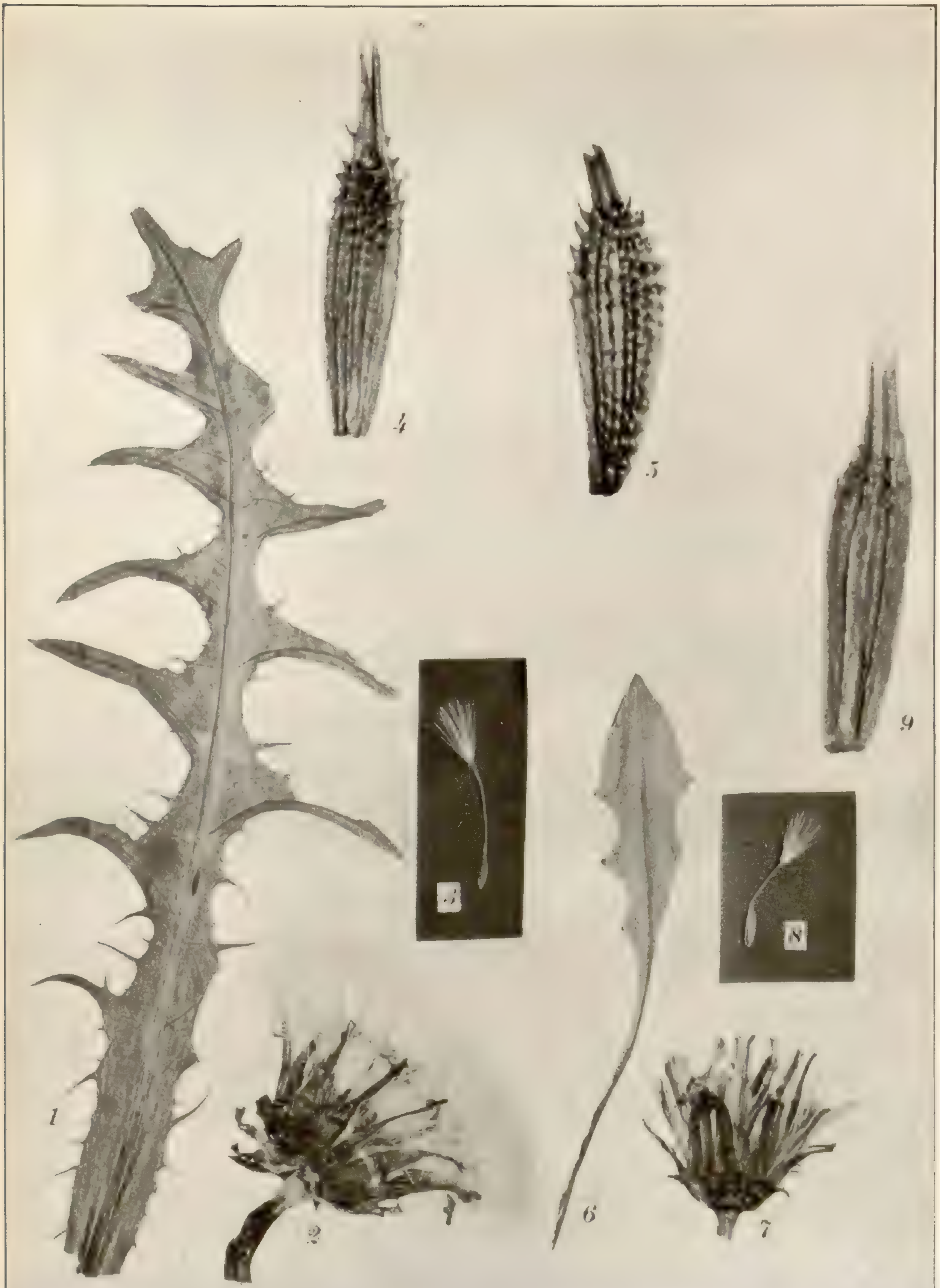
Furthermore, this failure of European students of *Taraxacum* to follow *T. palustre* to its nomenclatural source has led to another confusion. Thus, the combination *T. palustre* was properly published in Flore Française, iv.45 (1805), where Lamarck & DeCandolle made the same confusion as did Handel-Mazzetti later of "*Leontodon palustre*. Smith, Fl. brit. 2. p. 823" and *Hedypnois paludosa* Scop. The circumstance, that Lamarck & DeCandolle had mixed elements, in no wise changes the fact that NOMENCLATURALLY their *T. palustre* (1805) rested upon its name-bringing synonym, *L. palustre* Sm. (1800), therefore, upon *L. palustre* Lyons (1763), the latter reference given without qualification by Smith as his source. Nevertheless, although the name *T. palustre* already had perfectly valid publication for one species (in 1805), we find the new combination, *T. palustre* (Ehrh.) Dahlstedt, Bot. Notiser, 1905: 145 (1905) and Arkiv Bot. vii. no. 6: 8 (1908), based on *Leontodon Taraxacum palustre* Ehrh. (1790), not *L. palustre* Lyons (1763) nor *L. Taraxacum*, δ. *palustre* (Lyons) Huds. (1778), put forward and now being used in Skandinavian literature for a species of another section!

Israel Lyons' account, in his *Fasciculus Plantarum circa Cantabrigiam Nascentium* (1763), was as follows:

89. Leontodon (*palustre*) calyce toto erecto glabro, scapo cavo unifloro.
Leontodon calyce toto erecto glabro, foliis longe ellipticis denticulatis. *Gmel. sib.* 2. 15 ?
Habitat *in palustribus, on* Hinton Moor, *primus observavit* D. Car. Miller.
Folia *radicalia oblonga, ad apicem latiora, acuta denticulata glabra, nervo medio rubro.* Scapus *teres cavus uniflorus.* Calyx *glaber imbricatus,* squamae *externae ovatae acutae margine submembranaceae erectae; internae lineares.* Receptaculum *nudum,* Pappus *pilosus denticulatus stipitatus.*

Lyons' *Leontodon palustre* was well characterized nine years earlier than *Hedypnois paludosa* Scop. and, were the two conspecific, Lyons' name would have to be taken up instead of that of Scopoli. The "Folia *radicalia oblonga, ad apicem latiora*" and the "squamae *externae ovatae acutae margine submembranaceae erectae*" of Lyons' description indicate, however, that he had the variation of the common dandelion of meadows, lawns and fields with short and appressed outer bracts, not the wholly different *T. paludosum* (Scop.) Schlechter, a plant with thick linear-oblanceolate mostly unlobed leaves only 3–10 mm. wide, small heads with white-margined outer bracts, pale flowers and large achenes (5 mm. long) with very long pyramids. Smith, Engl. Bot. viii. t. 553 (1799), published a good plate of Lyons' species, after studying plants "raised from seed sent from Cambridgeshire" (the type-region). This plate and a number of sheets of specimens collected in England as *T. palustre* seem to leave no question that the common weed with linear or lanceolate strongly recurving outer bracts, *Leontodon vulgare* Lam. (1778), *T. officinale* Weber (1780), *T. Dens-leonis* Desf. (1800), differs from *Leontodon palustre* Lyons (1763) only in that single fickle character and that, consequently, the earliest specific name, *palustre*, must be used for the aggregate-species.

One way out of this awkward situation would be to treat the two as different species, which I am unable to do, in view of the fact that I cannot consider them specifically distinct. The only other possible way to avoid taking up *T. palustre* for the common weed, which usually passes as *T. officinale* or as *T. vulgare*, is to recognize the "accidental binomial," "*Dens leonis vulgaris*" of Hill, Brit. Herb. 441 (1756). There are many very strong objections to such a course. In the first place, Hill was not regularly using binomials; all other plants enumerated on the page, as well as on the preceding page, had polynomials. Furthermore, the double generic name *Dens leonis* is wholly irregular and it is quite possible to view *Dens leonis vulgaris* as a trinomial.



TARAXACUM LONGII: FIG. 1, leaf, × 1, from Grand River, Quebec; FIG. 2, head, × 1, from the TYPE, Ha-Ha Bay, Newfoundland; FIG. 3, achene, with beak and pappus, × 1, from the TYPE; FIG. 4, achene, × 10, from the TYPE.

T. LATILOBUM: FIG. 5, achene, × 10, from Newfoundland.

T. TORNGATENSE: FIG. 6, leaf, × 1, from the TYPE, Head of Nachvak Bay, Labrador; FIG. 7, head, × 1, from the TYPE; FIG. 8, achene, with beak and pappus, × 1, from the TYPE; FIG. 9, achene, × 10, from the TYPE.

To save the long-established name, *T. vulgare*, by going back to Hill for its justification does not seem the proper course. Either horn of the dilemma is unsatisfactory, but the cause of sound nomenclature, so long as the existing rules are in force, calls, unhappily, for the taking up of *T. palustre* (Lyons) Lam. & DC. for the less common weed of Europe and America; and *T. palustre*, var. *vulgare* for the superabundant weed of fields and lawns. Under the constructive and conservative (therefore discarded) "Kew Rule" this change would have been unnecessary.

If we could see with the eyes of some Scandinavian and English botanists, we should recognize in *Taraxacum palustre* many scores of species. Every slight divergence in the cutting of the leaves or the color of the corollas or the shade of the achenes would become a "species," and the weeding of a village park would yield at least a dozen of them. Personally, I can match the specimens on the lawn outside my window with authentic sheets of ten of Dahlstedt's "specific" propositions. Sound taxonomy demands good balance; if specific values are universally reduced to the point of absurdity the old and honored science of taxonomy will be doomed. The argument that, because often parthenogenetic, therefore vegetatively reproducing, these divergencies or biotypes in *Taraxacum* are self-perpetuating, could be applied equally to any vegetatively reproduced garden sport. Genetically they are not species nor anything but trivial variations which, under normal sexual reproduction, would quickly be lost in a common blend. They are no more species than are the color-forms of many garden flowers or the variously colored garden forms of cereals. Unless the *Taraxaca* have very real and deep-seated differences of involucre, flower and fruit and definite geographic segregation, it seems like stultification of science to treat them as species. We must not ignore the facts that all plastic and modern species consist of innumerable minor trends, but that these slight tendencies are utterly different from the true ("Linnean") species which, through millions of years, have stood the long test of competition and physiographic change. Call the minor variants *jordanons*, if you will, or the good and more generally used *formae* or the more modern *biotypes* but keep the good old term SPECIES for SPECIES. Shifting of meaning does not clarify terminology.

10. T. LAPPONICUM Kihlman, Meddel. Soc. Faun. Fl. Fenn. xi. 108 (1884); Handel-Mazzetti, l. c. 73 (1907). in part. *T. croceum* Dahlst.

in Anderss. & Hesselmen, Bih. K. Svenska Vet.-Ak. Hdlg. xxvi³. No. 1: 12 (1900).—Arctic and subarctic Eurasia and North America, south with us to Newfoundland and eastern Quebec. Labrador: Port Burwell, *Ralph Robinson*, no. 69; granitic rock, at Head of Main Arm of Ekortiarsuk Bay, *Woodworth*, nos. 441, 445; ridge (ca. 320 m.) extending south from East Bay, Ikordlearsuk, lat. 59° 55′, *Abbe & Odell*, nos. 585; on granitic rock, North Shore of Duck Bight, 1 km. n. of Ryan's Bay, *Woodworth*, no. 437; granitic rock under 760 m., Razorback Mt., Ryan's Bay, *Woodworth*, no. 439; tundra above the anchorage, Ryan's Bay, lat. 59° 35′, *Abbe & Odell*, nos. 588, 589; dry gravelly slopes, Near Island, Seven Islands Bay, Kangalaksiorvik, lat. 59° 18′, *Abbe*, no. 591; valley of Komaktorvik R., lat. 59° 15′, *Abbe*, no. 587; moist gully in cliff on north side of Razorback Harbor, lat. 59° 14′, *Abbe*, nos. 582, 584, 590; granitic cliffs, Head of Nachvak Bay, *Woodworth*, no. 438; Rama, *Sornberger*, nos. 64, 64x; granitic rock, Kikkertasoak Island, Saglek Bay, *Woodworth*, no. 436; Ogualik Island, lat. 57° 56′, *E. D. Brooks, jr.*, no. 586; lower ridge (ca. 595 m.) east of The Valley of the Twin Falls, Cape Mugford Peninsula, lat. 57° 50′, *Abbe*, no. 581; gravelly moraine, Mouth of Frazer R., lat. 57°, *Harlow Bishop*, no. 604; Anatolak, *C. S. Sewall*, nos. 334, 336; Titterasuk, *Sewall*, no. 12; wet spruce woods, Nain, lat. 56° 33′, *Sewall*, no. 66, *Harlow Bishop*, no. 605; Hopedale, *Sewall*, no. 176; "The Park," Hopedale, *Abbe, Hogg, & Forbes*, nos. 579, 580; Battle Harbor, *Sewall*, no. 193. Newfoundland: swaley cleft in bare rock, top of Fishing Head, St. Anthony, *Abbe*, no. 577; peaty and turfy brookside, Quirpon Island, *Fernald & Long*, no. 29,258; springy slopes and brooksides at head of Mauve (or Noddy) Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,259; mossy brooksides and damp turfy slopes, Sacred Island, *Fernald & Long*, no. 29,253; turfy limestone barrens, northern half of Burnt Cape, Pistolet Bay, *Fernald et al.*, nos. 29,250, 29,261 (as *T. ceratophorum*); turfy limestone barrens, Cook Point, *Fernald & Gilbert*, no. 29,251; turfy limestone slopes, Big Brook, Straits of Belle Isle, *Fernald & Long*, nos. 29,247, 29,257, *Fernald, Wiegand & Hotchkiss*, nos. 29,248 29,249, 29,265; turfy slope by sea, Four-Mile Cove, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,263; turfy or peaty limestone barrens, Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 27,174, *Fernald & Griscom*, no. 29,256 (distributed as *T. groenlandicum*); mossy glades back of Savage Cove, *Fernald & Long*, no. 29,246; swales and peaty limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 27,172; turfy limestone headlands and shores south of Flower Cove, *Pease, Long & Gilbert*, no. 29,255 as *T. ceratophorum* (2 or 3 bracts corniculate, but involucre otherwise of *T. lapponicum* and achenes of the latter); dripping quartzite cliffs and ledges, upper Deer Pond Brook, Highlands of St. John, *Fernald & Long*, no. 29,252; springy meadow on quartzite slope near head of Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 2108; turf overlying limestone, Grassy

Island, St. John Bay, *Fernald, Long & Fogg*, no. 2173; turfy talus of limestone sea-cliffs, Eastern Point, St. John Bay, *Fernald, Long & Fogg*, nos. 2161, 2162, 2166; turfy talus of limestone sea-cliffs or on limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, nos. 2164, 2165, 2171; dry peaty limestone barrens, Gargamelle Cove, *Fernald, Long & Fogg*, no. 2162; turfy spots on slaty calcareous talus, Cod Cove and Cutwater Head, Bay of Islands, *Fernald, Long & Fogg*. nos. 2169, 2170. QUEBEC: gravelly thicket back of strand, Bradore, *Fernald & Wiegand*, no. 4212 (as *T. ceratophorum*); grassy hillside, Rivière à la Truite and grassy bank, Pointe Jones, Brest, *St. John*, nos. 90,790, 90,791; sur les platières, R. du Brick, Anticosti, *Victorin & Rolland*, no. 27,552; au pied du grand Cap à l'embouchure, R. Vaureal, Anticosti, no. 27,553; sur les platières argilo-calcaires, R. Chicotte, Anticosti, no. 27,556; dans la prairie sur le plateau, Pointe du Sud-Ouest, Anticosti, no. 27,557; sur les rivages calcaires, R. de la Chute, Anticosti, no. 27,558; calcareous alpine meadow, alt. 1000–1125 m., Table-top Mts., *Fernald & Collins*, no. 789 (as *T. ceratophorum*); canyon humide, cirque nord-est, Botanist Dome, Mt. de le Table, *Rousseau & Fortier*, no. 31,500; by alpine brooks or in wet crevices of hornblende schist, alt. 600–1075 m., Mt. Albert, *Fernald & Collins*, nos. 263, 785 (as *T. ceratophorum*); sur les schistes hornblendiques et les paragneiss, alt. 1000 m., Lac du Ruisseau du Plaque-Malade, Mt. Albert, *Victorin, Rolland, Brunel & Rousseau*, no. 17,537; subalpine meadows (alt. 850–880 m.) Fernald Pass, between Mts. Mattaouisse and Fortin, *Fernald, Griscom & Mackenzie*, no. 26,117 (as *T. ceratophorum*); banks of Grand River, Gaspé Co., June 20–July 10, 1903, *G. H. Richards*, June 30–July 3, 1904, *Fernald;* wet red sandstone bluffs and steep slopes, between Baldé and the Baie des Chaleurs, Bonaventure River, August, 1904, *Collins, Fernald & Pease;* damp ledges and cliffs between the Forks and Brûlé Brook, Little Cascapedia R., July, 1904, *Collins, Fernald & Pease*. PLATE 271, FIG. 10.

It is probable that several of the plants described from the Rocky Mts. by Greene, Rydberg and others belong to *Taraxacum lapponicum*. Without better fruit than they described the proper disposition of these species must await fuller collections.

11. T. **torngatense**, sp. nov. (TAB. 273, FIGS. 6–9). Planta gracilis; foliis tenuibus lineari-oblanceolatis 0.5–1.8 dm. longis 1–2.5 cm. latis, basi longe-petiolatis, margine lobis oblique deltoideis integris; scapo 0.7–1.5 dm. longo; capitulis mediocribus; bracteis exterioribus fuscescentibus lanceolatis 5–8 mm. longis erectis vel subpatentibus apice planis; bracteis interioribus 12–15 lineari-lanceolatis 13–16 mm. longis apice planis vel rariter subcorniculatis; achaeniis cinnamomeis vel rufescentibus anguste fusiformibus 4–4.5 mm. longis apice ad pyramide attenuatis emuricatis vel rariter submuricatis; pyramide subulata 1.5–2 mm. longa; rostro 5–6 mm. longo; pappo albido 5–6 mm. longo. NORTHERN LABRADOR: granite rock, North Shore of

Duck Bight, 1 km. north of Ryan's Bay, August 24, 1926, *R. H. Woodworth*, no. 446 (as *T. ceratophorum*); granitic rock under 760 m., Razorback Mt., Ryan's Bay, August 23, 1926, *Woodworth*, no. 444; granitic cliffs at 150–600 m., Head of Nachvak Bay, August 17, 1926, *Woodworth*, no. 443 (TYPE in Gray Herb.).

Taraxacum torngatense is proposed with some hesitation. Superficially it is suggestive of the most attenuate states of *T. lapponicum*, but the very attenuate and almost to quite smooth achenes and the very long pyramid seem to set it off very definitely from its allies. Much fuller material, especially in ripe fruit, is needed. Writing of the type-number in a letter of November 14, 1927, Dahlstedt said: "Undoubtedly a good new species, very well characterized through the almost smooth reddish-brown fruits."

(To be continued.)

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Concluded from page 386*)

Additional Notes

While the preceding eleven instalments have been in the course of publication my attention has been called to necessary changes in nomenclature. Such as have come to attention follow, although it will doubtless be found that some earlier homonyms besides those already detected will necessitate further change. That is the inevitable result of the adoption of the "homonym rule" without any safeguarding.

Carex incurva Lightf. On pages 56, 60 and 216 I made notes on *C. incurva* Lightf. (1777) and its var. *setina* Christ (1888), publishing

a map (MAP 4) of the range and a photograph (PLATE 247, FIG. 1) of the latter. Most unfortunately, however, strict priority in nomenclature forces us to abandon the perfectly familiar name *C. incurva* for a characteristic and notable species of bipolar distribution and to take up for it a name, *C. maritima*, which has been equally familiar as the apellation of one of the most definite species of a wholly different section of the genus.

Carex maritima Gunner, Fl. Norveg. ii. 131 (1772), not *C. maritima* O. F. Muell., Fl. Dan. iv. fasc. xii. 6, t. dcciii (1777), was briefly but clearly diagnosed and based on an earlier diagnosis and excellent analytical plate:

> CAREX (*maritima*) spica unica, subrotunda; glumis ovatis, brevissime aristatis. *Hall.* 1354? *Oed. dan.* VIII.
>
> Norv. *Fjaerestar*. Habitat in arena littorea norv. Oeder.

C. maritima Gunner, was, therefore, established chiefly on the species described, without binomial, and well illustrated by Oeder in Flora Danica, iii. fasc viii. (pl. ccccxxxii):

> *Carex spica unica subrotunda, glumis ovatis, brevissime aristatis.* Hall. 1354?
>
> Locus. In arenosis maritimis Norvegiae.

Both Oeder and, after him, Gunner, thought that the seashore plant of Norway might be species no. 1354 of Haller, but both expressed doubt on that point. *C. maritima* Gunner must, therefore, rest upon the Norwegian plant actually illustrated. This is without question the later-described *C. incurva* Lightf.

The detection of the priority of *Carex maritima* Gunner (1772), a name not caught either in *Index Kewensis* or by Kükenthal, over *C. incurva* Lightf. (1777) and over the wholly different *C. maritima* O. F. Muell. (1777) was made by Kreczetowicz, who, in a study of *Carex incurva sensu Kuekenthal*,[1] correctly takes up *C. maritima* for *C. incurva* but, less correctly, it seems to me, splits *C. incurva*, upon characters which are not satisfactorily constant in the material before me, into several proposed species: *C. transmarina* V. Krecz. for the plant of Greenland, *C. orthocaula* V. Krecz. for that of the Bering sea area, *C. jucunda* V. Krecz. for that of Newfoundland, etc. *C. setina* (Christ) V. Krecz. is set up for the dwarf *C. incurva*, var. *setina* Christ; and Simmons's ecological state of *C. incurva*, with culms showing the inflation so frequent in submersed individuals of many species, *C. incurva* var. *inflata* Simmons, appears as a new species, *C.*

[1] V. Krecz. Bull. Jard. Bot. del'Acad Sci. deL'Urss. xxx. 119–138 (1932).

psychroluta V. Krecz., without a single specific character stated and only the description of Simmons directly quoted: "rhizoma longum inter muscos in aqua libera natans, culmus erectus valde inflatus, spica subglobosa."

Although I find myself unable to follow Kreczetowicz in his oversplitting of *Carex maritima* and his specific segregation from the northern European plant of the material from Greenland, Newfoundland and other North American areas, there are some well-defined geographic varieties which, unfortunately, have to be called

CAREX MARITIMA Gunner, var. **setina** (Christ), comb. nov. *C. incurva*, var. *setina* Christ in Scheutz, Pl. Vasc. Jeniseens. 174 (1888)—Kongl. Svensk. Vet.-Akad. Handl. xxii. no. 10: 174 (1888). *C. setina* (Christ) V. Krecz. Bull. Jard. Bot. de l'Acad. Sci. de L'Urss, xxx. 136 (1932).

C. MARITIMA, var. **melanocystis** (Desv.), comb. nov. *C. melanocystis* Desv. in Gay, Hist. Bot. Chile, vi. 203, t. 73, fig. 5 (1853). *C. incurva*, var. *melanocystis* (Desv.) Kükenth. in Engler, Pflanzenr. iv.[20] 114 (1909).

C. MARITIMA, var. **misera** (Phil.), comb. nov. *C. misera* Phil. Florul. Atacam. 388 (1860). *C. melanocystis*, var. *misera* (Phil.) Kükenth. in Engler, Bot. Jahrb. xxvii. 499 (1899). *C. incurva*, var. *misera* (Phil.) Kükenth. in Engler, Pflanzenr. iv.[20] 114 (1909).

The coarse maritime species with spreading or pendulous pistillate spikes with very prolonged scales, *Carex maritima* O. F. Muell. Fl. Dan. iv. fasc. xii. 6, t. dcciii (1777), not Gunn. Fl. Norv. ii. 131 (1772), must, apparently, be called C. PALEACEA Wahlenb. Vet.-Akad. Nya Handl. Stockh. xxiv. 164 (1803). The plant of Scandinavia and Russia, typical *C. paleacea*, is comparatively low, with culms 1–5 dm. high ("20–50 cm. altus"—*Kükenthal;* "3–5"—*Lindmann;* but, as shown in the Gray Herbarium, sometimes only 1 dm. high); the American plant is more variable, ranging from 0.2–1 m. high. The leaves of European *C. paleacea* are accurately described by Kükenthal as "4–8 mm. lata"; but those of the larger American specimens are often 10–12 mm. broad. The European plant has the pistillate spikes "2–5 cm. longae" (*Kükenthal*); but in ours the length is 2–7 cm. In typical European *C. paleacea* the perigynium has a minute beak, barely 0.2 mm. long; the beak in the American series is distinctly longer, 0.3–0.5 mm. long. The plant of eastern America is, therefore, a well defined geographic variety which I am calling

CAREX PALEACEA Wahlenb., var. **transatlantica**, var. nov., culmis 0.2–1 m. altis; foliis 0.5–1.2 cm. latis; spicis femineis 2–7 cm. longis;

perigyniis valde rostratis, rostro 0.3–0.5 mm. longo.—Coast of Labrador to Massachusetts; shores of James Bay. Type: meadows and swamps in the slaty region, south and east of Bic, Quebec, July 17, 1907, *Fernald & Collins*, no. 930 (in Gray Herb.).

Carex maritima, var. *erectiuscula* Fern. Rhodora, ii. 170 (1900) seems to be a hybrid of *C. paleacea*, var. *transatlantica* and *C. salina*, var. *kattegatensis*. A plant of the shores of the White Sea in Russian Lapland seems well distinguished from typical *C. paleacea* by its browner and erect spikes. This is

C. paleacea, var. **brunnescens** (F. Nylander), comb. nov. *C. maritima*, var. *brunnescens* F. Nylander, Spic. Fl. Fenn. ii. 20 (1844).

Carex Vahlii Schkuhr, var. **inferalpina** (Wahlenb.), comb. nov. *C. alpina*, var. *inferalpina* Wahlenb., Fl. Lapp. 241 (1812); Fernald, Rhodora, xxxv. 223, t. 248, figs. 3, 4, 8 and 9 (1933). *C. angarae* Steud. Syn. Cyp. 190 (1855). *C. alpina*, forma *inferalpina* (Wahlenb.) Kükenthal in Engler, Pflanzenr. iv.[20] 386 (1909).

C. Vahlii, var. **Stevenii** (Holm.), comb. nov. *C. alpina*, var. *Stevenii* Holm, Am. Journ. Sci. ser. 4, xvi. 21, 27 (1903); Fernald, l. c., figs. 5 and 10 (1933).

Unfortunately *Carex alpina* Swartz (1798), which I used in the earlier part of this paper, is invalidated, as Mr. Mackenzie points out to me, by the earlier *C. alpina* Schrank (1789) and another, *C. alpina* Honck. (1792). So far as I can yet determine, the earliest available specific name for our plant is *C. Vahlii* Schkuhr, Riedgr. i. 87, t. Gg. no. 94 (1801).

Habenaria orbiculata (Pursh) Goldie.

The reference to *Habernaria orbiculata* (Pursh) Torr. on p. 240 should read *H. orbiculata* (Pursh) Goldie. The species rests nomenclaturally entirely on *Orchis orbiculata* Pursh. In publishing *H. macrophylla* Goldie, Edinb. Phil. Journ. vi. 331 (1822), its author made the transfer of *Orchis orbiculata* to *Habenaria*, saying of his new *H. macrophylla* "It must rank next to *Habenaria orbiculata* (*Orchis* of Pursh and Nuttall), having, like it, two plane, orbicular, approaching to elliptical, *leaves*, ... and which, in this plant, are four times as large as those of *H. orbiculata*." Even though one may read into this comparison of the leaf-size the influence of Hooker's misidentification of *Orchis orbiculata* Pursh,[1] yet from a purely nomenclatural standpoint *H. orbiculata* rests alone upon the Pursh species, which is the plant we have recently been correctly calling by that name: "In the herbarium at Kew there is a specimen of *Habenaria*

[1] See Ames, Rhodora, viii. 2 (1906).

orbiculata which appears to be the type. On the reverse of the sheet on which it is mounted, in the upper left-hand corner, the name 'Fred Pursh' is written. Presumably, this specimen was obtained by Hooker when the Lambert collection was sold, as Lambert possessed Pursh's herbarium."[1]

EUPHRASIA STRICTA Host (see p. 306). Professor Wiegand kindly calls my attention to the fact that *E. stricta* Host, Fl. Austr. ii. 185 (1831) in antedated by *E. stricta* HBK. Nov. Gen. et Sp. ii. 333 (1818). The removal of the latter species long since from *Euphrasia*, made *E. stricta* Host available and valid under the International Rules until they were fundamentally (and, I believe, unwisely) altered in 1930. Under the present dispensation our plant should probably be called E. RIGIDULA Jord. Pug. Pl. Nov. 134 (1852).

EXPLANATION OF PLATES 232–273.

PLATES 232–238. Sufficiently explained in the legends.

PLATE 239. NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, SOLIDAGO MACROPHYLLA Pursh, var. THYRSOIDEA (E. Meyer) Fern., from Bard Harbor Hill, *Fernald et al.*, no. 29,103; FIG. 2, SENECIO PAUPERCULUS Michx., var. FIRMIFOLIUS Greenm., from Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 27,164; FIG. 3, SAXIFRAGA OPPOSITIFOLIA L., from Flower Cove, *M. E. Priest;* FIG. 4, SAXIFRAGA CESPITOSA L., from Plum Point, Brig Bay, *Fernald, Long & Dunbar*, no. 26,743; FIG. 5, DRABA INCANA L., var. CONFUSA (Ehrh.) Poir., from Burnt Cape, *Fernald et al.*, no. 28,350; all × 1.

PLATE 240. NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, POTENTILLA FRUTICOSA L., from Port au Port Bay, *Fernald & Wiegand*, no. 3579; FIG. 2, POTENTILLA NIVEA L., var. MACROPHYLLA Ser., from St. John Island, *Fernald et al.*, no. 28,527; FIG. 3, LESQUERELLA PURSHII (Wats.) Fern., from Old Port au Choix, *Fernald, Long & Fogg*, no. 1724; FIG. 4, PLANTAGO JUNCOIDES Lam., var. GLAUCA (Hornem.) Fern., from St. John Island, *Fernald et al.*, no. 29,058; FIG. 5, POA ALPINA L., var. BREVIFOLIA Gaudin, from Savage Cove, *Fernald, Pease & Long*, no. 27,394; all × 1.

PLATE 241. MUHLENBERGIA UNIFLORA (Muhl.) Fern., var. TERRAE-NOVAE Fern.: FIG. 1, habit, × 1, from Grandy Brook, Newfoundland, *Fernald, Long & Fogg*, no. 101; FIG. 2, spikelet from no. 101, × 10. FESTUCA PROLIFERA (Piper) Fern., var. LASIOLEPIS Fern.: FIG. 3, plant, × 1, from TYPE collection, Stanleyville, Newfoundland, *Fernald, Long & Fogg*, no. 1236; FIG. 4, spikelet from TYPE, × 4.

PLATE 242. CATABROSA AQUATICA (L.) Beauv.: FIG. 1, panicle, × 1, from Lund, Sweden, *Nilsson;* FIG. 2. summit of culm, × 6. C. AQUATICA, var. LAURENTIANA Fern.: FIG. 3, panicle, × 1, from Southport, Prince Edward Island, *Fernald & St. John*, no. 6881; FIG. 4, summit of culm, × 6, from Port aux Basques, Newfoundland, *Fernald, Long & Dunbar*, no. 26,285. C. AQUATICA, var. UNIFLORA S. F. Gray: FIG. 5, panicle, × 1, from Valais, Switzerland, *Joad;* FIG. 6, summit of culm, × 6, from Upsala, Sweden, *Ahlberg;* FIG. 7, panicle, × 1, from Henry Lake, Fremont Co., Idaho, *Payson & Payson*, no. 2017; FIG. 8, summit of culm, × 6, from no. 2017.

PLATE 243. AGROPYRON TRACHYCAULUM (Link) Steud.: FIG. 1, inflorescence, × 1, from Fort Garland, Colorado, 1884, *Vasey*, TYPE collection of *A. tenerum* Vasey; FIG. 2, inflorescence, × 1, from Mt. Ste. Anne, Percé, Quebec, *Collins*

[1] Ames, Orchidaceae, iv. 144 (1910).

& Fernald, no. 36; FIG. 3, internode of rachilla, × 10, from Rivière à Pierre, Quebec, *Fernald & Smith*, no. 25,465. A. TRACHYCAULUM, var. MAJUS (Vasey) Fern.: FIG. 4, mature (contracted) inflorescence, × 1, from Kearney, Nebraska, *Shear*, no. 272, TOPOTYPE of *A. pseudorepens* Scribn. & Smith; FIG. 5, young inflorescence, × 1, from Little River, Newfoundland, *Mackenzie & Griscom*, no. 11,178; FIG. 6, internodes of rachilla, × 10, from Grand Falls, Newfoundland, *Fernald & Wiegand*, no. 4686. A. TRACHYCAULUM, var. NOVAE-ANGLIAE (Scribn.) Fern.: FIG. 7, young inflorescence, × 1, from the type region, Willoughby Mt., Vermont, *E. F. Williams;* FIG. 8, ripe (contracted) inflorescence, × 1, from Newbury, Massachusetts, *A. A. Eaton;* FIG. 9, internodes of rachilla, × 10, from Willoughby, Vermont, *Eggleston*, no. 2177.

PLATE 244. AGROPYRON TRACHYCAULUM (Link) Steud., var. GLAUCUM (Pease & Moore) Malte: FIG. 1, inflorescence, × 1, from Kelly Point, Pembroke, Maine, *Fernald*, no. 1367, TYPE of the variety; FIG. 2, inflorescence, × 1, from Comox, Vancouver Island, British Columbia, *Malte*, no. 107,855, TYPE of var. *caerulescens* Malte; FIG. 3, inflorescence, × 1, from Victoria, British Columbia, *Malte*, no. 108,309, TYPE of var. *pilosiglume* Malte; FIG. 4, internode of rachilla and base of lemma, × 10, from TYPE. A. TRACHYCAULUM, var. UNILATERALE (Cassidy) Malte: FIG. 5, inflorescence, × 1, from Rivière au Saumon, Anticosti I., Quebec, *Victorin & Rolland*, no. 27,886; FIG. 6, inflorescence, × 1, from Dry Fork of Belt Creek, Montana, *Rydberg*, no. 3352; FIG. 7, internode of rachilla and base of lemma, × 10, from *Victorin & Rolland*, no. 27,886.

PLATE 245. Inflorescences, × 1, of, FIG. 1, AGROPYRON REPENS (L.) Beauv., from Sandy Bay, Quebec, *Fernald & Collins*, no. 385; FIG. 2, A. REPENS, forma ARISTATUM (Schum.) Holmb., from Manchester, Maine, *Scribner*, no. 22; FIG. 3, A. REPENS, var. SUBULATUM (Schreb.) Reichenb., from Shediac Cape, New Brunswick, *Hubbard*, no. 707; FIG. 4, var. SUBULATUM, forma VAILLANTIANUM (Wulf. & Schreb.) Fern., from Jamaica Plain, Massachusetts, *Faxon;* FIG. 5, A. PUNGENS (Pers.) R. & S., from Harwich, Massachusetts, *Fernald*, no. 16,251.

PLATE 246. AGROSTIS SCABRA Willd., var. SEPTENTRIONALIS Fern.: FIG. 1, portion of panicle, × 1, from Main River, Bonne Bay, Newfoundland, *Fernald & Long*, no. 1306; FIG. 2, mature spikelets, × 6, from no. 1306. A. HYEMALIS (Walt.) BSP. (*A. antecedens* Bickn.): FIG. 3, young panicle, × 1, from Telford, Pennsylvania, *Benner;* FIG. 4, expanded panicle, × 1, from Jamaica, Long Island, New York, *Bicknell;* FIG. 5, mature spikelets, × 6, from Wady Petra, Illinois, *V. H. Chase* in Kneucker, Gram. Exsicc. no. 569.

PLATE 247. FIG. 1, CAREX MARITIMA Gunn., var. SETINA (Christ) Fern. (*C. incurva* Lightf., var. *setina* Christ), × 1, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1373. FIG. 2, C. LANGEANA Fern., × 1, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1374.

PLATE 248. CAREX VAHLII Schkuhr (*C. alpina* Sw.): FIG. 1, inflorescence, × 3, from the Engadine, Graubünden, Switzerland, *Zahn*, no. 17; FIG. 6, perigynium of no. 17, × 6; FIG. 2, inflorescence, × 3, from Anse aux Sauvages, Newfoundland, *Fernald, Wiegand & Long*, no. 27,699; FIG. 7, perigynium of same, × 6. C. VAHLII, var. INFERALPINA (Wahlenb.) Fern.: FIG. 3, inflorescence, × 3, from Austria, *Arnell;* FIG. 8, perigynium, of same, × 6; FIG. 4, inflorescence, × 3, from North Fork of Madeleine River, Quebec, *Fernald, Dodge & Smith*, no. 25,549; FIG. 9, perigynium of same, × 6. C. VAHLII, var. STEVENII (Holm) Fern.: FIG. 5, inflorescence, × 3, from Estes Park, Colorado, *Hunnewell;* FIG. 10, perigynium of same, × 6. C. VESICARIA L., var. LAURENTIANA Fern.: FIG. 11, inflorescence, × 1, from Chevalier, Saguenay Co., Quebec, *St. John*, no. 90,279; FIG. 12, inflorescence, × 1, from the TYPE, Doctor Hill, Newfoundland, *Fernald, Long & Fogg*, no. 1474.

PLATE 249. JUNCUS TRIGLUMIS L.: FIG. 1, habit, × 1, from Vajoletthal, Tyrol, *A. S. Pease*, no. 13,386; FIG. 2, fruiting glomerule, × 6, from near Katon-Karagai, Prov. Semiplatinsk, western Siberia, July 29, 1928, *Krylov & Sergievskaja;* FIG. 3, seeds, × 12, from Val de Fain, Haut Engadin, Switzer-

land, August 10, 1868, *Shuttleworth*. J. ALBESCENS (Lange) Fern.: FIG. 4, habit, × 1, from St. John Island, St. John Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,787; FIG. 5, fruiting glomerule, × 6, from Capstan Point, Flower Cove, Newfoundland, *Fernald, Long & Dunbar*, no. 26,492; FIG. 6, seeds, × 12, from Rock Marsh, Flower Cove, Newfoundland, *Fernald, Long & Dunbar*, no. 26,494.

PLATE 250. CYPRIPEDIUM PARVIFLORUM Salisb., var. PLANIPETALUM Fern.: FIG. 1, large plant, × 1, from Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 1533; FIG. 2, small plant, × 1, from TYPE collection, Savage Cove, Newfoundland, *Fernald & Long*, no. 27,851.

PLATE 251. HABENARIA STRAMINEA Fern.: FIG. 1, habit, × 1, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 1543; FIG. 2, flowers, × 6, from Burnt Cape, Pistolet Bay, Newfoundland, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 27,889. H. ALBIDA (L.) R. Br.; FIG. 3, flowers, × 6, from Glen Lochay, Killin, Tayside, Perthshire, Scotland, June 25, 1927, *Frank Morris*.

PLATE 252. HABENARIA HOOKERI Torr., var. ABBREVIATA Fern.: habit, × 1, from TYPE collection, Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1553; flower, × 2, from TYPE (upper insert). H. HOOKERI: flower, × 2, from Wallingford, Vermont, *Kennedy*.

PLATE 253. MALAXIS BRACHYPODA (Gray) Fern.: FIG. 1, habit, × 1, from Rock Marsh, Flower Cove, Newfoundland, *Fernald, Pease & Long*, no. 27,927; FIG. 2, flowers, showing drooping lip, × 4, from the type region, Cedar Lake, Herkimer Co., New York, *J. V. Haberer*, no. 893; FIG. 3, fruit, showing reflexed perianth, × 4, from Mars Hill, Maine, September 8, 1896, *Fernald;* FIG. 4, buds, just before expansion, × 4, from Rivière aux Marsouins, Quebec, *Fernald & Weatherby*, no. 2429. M. MONOPHYLLOS (L.) Sw.: FIG. 5, flowers, showing erect lip, × 4, from Kloster-Schwaderloch, Switzerland, *Zoja* in *Braun-Blanquet*, Fl. Raet. Exsicc., no. 123; FIG. 6, fruit, with shriveled perianth projected forward, × 4, from St. Petersburg, Russia, *Herb. Fl. Ingricae*, no. 627; buds, just before expansion, × 4, from Graswangthal, Bavaria, *F. Schultz*, Herb. Norm., no. 950.

PLATE 254. SALIX WIEGANDII Fern., × 1: FIG. 1, mature branchlet, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 1605; FIGS. 2 and 3, flowering (pistillate) branchlets from the TYPE collection, Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1602.

PLATE 255. ARENARIA MARCESCENS Fern.: FIG. 1, fragments, in flower, × 1, from Mt. Albert, Quebec, *Fernald, Griscom, Mackenzie & Smith*, no. 25,725; FIG. 2, fragment, in fruit, × 1, from the TYPE, Blomidon, Newfoundland, *Fernald & Wiegand*, no. 3365; FIG. 3, seeds, × 10, from the TYPE, no. 3365.

PLATE 256. ARENARIA NORVEGICA Gunn.: FIG. 1, entire plant, × 1, from Lake Torneträsk, Torne Lappmark, *Alm*, Intern. Phytogeogr. Exc., no. 3897: FIG. 2, seeds, × 10, from Hjerkinn, Norway, *A. S. Pease*, no. 20,773. A. CYLINDROCARPA Fern.: FIG. 3, fragments in young fruit, × 1, from The Tableland, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1675; FIG. 4, flower, to show expanded calyx, × 6, from Mt. Albert, Quebec, *Fernald, Griscom, Mackenzie & Smith*, no. 25,730; FIG. 5, mature capsule and calyx, × 6, from St. John Island, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,180; FIG. 6, seeds, × 10, from no. 28,180.

PLATE 257. CERASTIUM TERRAE-NOVAE Fern. & Wieg.: FIG. 1, small plants, × 1, from The Tableland, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1685; FIG. 2, seeds, showing one with ruptured testa, × 10, from the TYPE, Blomidon, Newfoundland, *Fernald & Wiegand*, no. 3390.

PLATE 258. LESQUERELLA ARCTICA (Wormsk.) Wats.: FIG. 1, small plant, × 1, from Sewell Harbor, lat. 78° 30′, western Greenland, *Ralph Robinson*, no. 38; FIG. 2, fruit, × 1, from Nûgssuaq Halvø, Pâtût, lat. 70° 15′, western Greenland, July 3, 1929, *M. P. & R. T. Porsild;* FIG. 3, flower (shriveled), showing lance-acuminate sepals, × 4, from Ritenbenks Kulbrud, lat. 70° 3′, Disco, Greenland, June 4, 1924, *A. E. Porsild*. L. PURSHII (Wats.) Fern.:

FIG. 4, small plant, × 1, from Big Brook, Straits of Belle Isle, Newfoundland, *Long & Gilbert*, no. 28,335; FIG. 5, fruit, × 1, from Green Gardens, Cape St. George, Newfoundland, *Mackenzie & Griscom*, no. 11,016; FIG. 6, flower, showing oblong, obtuse sepals, × 4, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1725.

PLATE 259. EPILOBIUM PYLAIEANUM Fern.: FIGS. 1, 2 and 3, fruiting and flowering plants, × 1, from Burgeo, Newfoundland, *Fernald, Long & Fogg*, no. 332; FIG. 4, flower, showing oblong, obtuse calyx-lobes, × 6, from no. 332; FIG. 5, seed, showing slender beak, × 10, from the TYPE, Port aux Basques, Newfoundland, *Fernald, Long & Dunbar*, no. 26,865.

PLATE 260. VACCINIUM NUBIGENUM Fern.: flowering branch, × 1, from Deep Gulch, Doctor Hill, Newfoundland, *Fernald, Long & Fogg*, no. 1936; FIG. 2, margin of leaf, × 4, from no. 1936; FIG. 3, flower, × 4, from no. 1936; FIG. 4, anthers, × 8, from no. 1936. V. CESPITOSUM Michx.: anthers, × 8, from Flower Cove, Newfoundland, *Pease, Long & Gilbert*, no. 28,868. V. OVALIFOLIUM Sm.: anthers, × 8, from Mt. Hood, Oregon, *Henderson*, no. 744.

PLATE 261. ASTER TRADESCANTI L., × ⅔: type of species in Clifford Herbarium, British Museum, with designation of Asa Gray, "vera" (photographed by *M. L. Fernald*, September, 1903).

PLATE 262. ASTER TRADESCANTI L., × ½: upper three-fourths of sheet from Sandy Cove, Digby Co., Nova Scotia, *Fernald & Long*, no. 22,762, identified (correctly) by Wiegand as *A. saxatilis* (Fern.) Blanchard.

PLATE 263. ANTENNARIA COLUMNARIS Fern., × 1, from the TYPE collection, Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 2076; insert, × 2, to show tips of crowded cauline leaves.

PLATE 264. ANTENNARIA FOGGII Fern., × 1, from TYPE collection, Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2100; insert, × 2, to display leaf-tips and coherent bracts.

PLATE 265. ANTENNARIA BAYARDI Fern., × 1, from TYPE collection, Tucker's Head, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2097; insert, × 2, to show leaf-tips and loose bracts.

PLATE 266. ANTENNARIA BRUNNESCENS Fern., × 1, from TYPE collection, alt. 650 m., Killdevil, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2105; insert, × 2, to show leaf-tips and broad bracts.

PLATE 267. ANTENNARIA CANA (Fern. & Wieg.) Fern., × 1, plant at left from type station of species, Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 2087; plant at right from TYPE collection of *A. Longii* Fern., Schooner (or Brandy) Island, Pistolet Bay, Newfoundland, *Pease & Long*, no. 29,177; inserts, × 2, from collections shown below, to display leaf-tips and loose involucres.

PLATE 268. ANTENNARIA CONFUSA Fern. (left), × 1, from TYPE collection, Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2078; insert × 2. A. GASPENSIS Fern. (right), × 1, from Penguin Head, Bay of Islands, Newfoundland, *Fernald, Long & Fogg*, no. 2107; insert, × 2.

PLATE 269. ARNICA CHIONOPAPPA Fern.: FIG. 1, small plant, to show characteristic 3-nerved basal leaves, × 1, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2136; FIG. 2, achene and disk-corolla, × 6, from Shag Cliff, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2137. A. TOMENTOSA J. M. Macoun: FIGS. 3 and 4, small plants, × 1, from Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2127; FIG. 5, achene and disk-corolla, × 6, from no. 2127.

PLATE 270. ARNICA LOUISEANA Farr: FIG. 1, small plant, × 1, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2140; FIG. 2, achene and disk-corolla, × 6, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 2143. A. TERRAE-NOVAE Fern.: FIG. 3, small plants, × 1, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2124; FIG. 4, achene and disk-corolla, × 6, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 2126.

PLATE 271. TARAXACUM CERATOPHORUM (Led.) DC.: FIGS. 1 and 2, small plant and individual head, to show characteristic involucre, × 1, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 7172; FIG. 3, achene with beak and pappus, × 1, from no. 7172; FIG. 4, achene, × 10, from no. 7172. T. AMBIGENS Fern.: FIG. 5, small leaf, × 1, from the TYPE, Port au Choix, *Fernald, Long & Fogg*, no. 2167; FIG. 6, head, with characteristic reflexing outer bracts, × 1, from the TYPE; FIG. 7, achene with beak and pappus, × 1, from the TYPE; FIG. 8, achene, × 10, from the TYPE. T. AMBIGENS, var. FULTIUS Fern.: FIG. 9, head, showing appressed outer involucre, × 1, from the TYPE, Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 2163. T. LAPPONICUM Kihlm.: FIG. 10, characteristic achene, × 10, from Sandy (Poverty) Cove, Straits of Belle Isle, Newfoundland, *Fernald, Long & Dunbar*, no. 27,174.

PLATE 272. TARAXACUM PHYMATOCARPUM Vahl.: FIG. 1, plant, × 1, from Sewall Harbor, lat. 78° 30′, western Greenland, *Ralph Robinson*, no. 40; FIG. 2, achene (dark) with characteristic short beak, × 1, from Netiuleme, Whale Sound, Greenland, *Wetherell*, no. 175, in part; FIG. 3, achene, × 10, from no. 175. T. LYRATUM (Led.) DC.: FIG. 4, achene, × 10, from high alpine region, Colorado, *Hall & Harbour*. T. LAURENTIANUM Fern.: FIG. 5, leaf, × 1, from the TYPE, base of Ha-Ha Mountain, Ha-Ha Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,245; FIGS. 6 and 7, heads, showing characteristic involucre, × 1, from the TYPE; FIG. 8, achene, with the long beak and long pappus, × 1, from the TYPE; FIG. 9, achene, × 10, from the TYPE. T. DUMETORUM Greene: FIG. 10, achene, × 10, from Medicine Hat, Alberta, June 8, 1894, *John Macoun*.

PLATE 273. TARAXACUM LONGII Fern.: FIG. 1, leaf, × 1, from Grand River, Gaspé Co., Quebec, June 30–July 3, 1904, *Fernald;* FIG. 2, head, showing characteristic involucre, × 1, from the TYPE, base of Ha-Ha Mountain, Ha-Ha Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,244; FIG. 3, achene, with beak and pappus, × 1, from TYPE; FIG. 4, achene, × 10, from TYPE. T. LATILOBUM DC.: FIG. 5, achene, × 10, from Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2159. T. TORNGATENSE Fern.: FIG. 6, leaf, × 1, from the TYPE, Head of Nachvak Bay, Labrador, *Woodworth*, no. 443; FIG. 7, head from TYPE; FIG. 8, achene, with comparatively short beak, and pappus, × 1, from TYPE; FIG. 9, achene, × 10, from TYPE.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.

No. CII.

1. Studies in the *Bromeliaceae*.—IV. By Lyman B. Smith 145
2. The *Bromeliaceae* of Trinidad and Tobago. By W. E. Broadway and L. B. Smith 152

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY,—No. CII.

1. STUDIES IN THE BROMELIACEAE.—IV.

By Lyman B. Smith.

Presented January 11, 1933. Received February 6, 1933.

The following paper places on scientific record the novelties to be included in the publication of the *Bromeliaceae* of Trinidad and also such new or noteworthy species as have come to the writer's attention in a general study of the family during the past year. The form used is that of previous papers in this series.

In this paper and the succeeding one, the authors are indebted to the following institutions for the opportunity to study their material or photographs thereof: the Herbarium of the Royal Botanic Gardens of Trinidad and Tobago (Trin), the Gray Herbarium of Harvard University (G), the New York Botanical Garden (NY), the United States National Museum (US), the Field Museum of Natural History (FM), the Royal Botanic Gardens at Kew (K), the Missouri Botanical Garden (Mo), the Riks Museum at Stockholm (S), the Biological Institute of São Paulo (SP), the Herbarium of the Botanical Museum at Berlin-Dahlem (B), the British Museum of Natural History (BM), the Conservatory of Botany at Geneva (Gen), the National Museum of Rio de Janeiro, the National Museum of Natural History of Buenos Aires (BA), the private herbarium of Cornelio Osten, Montevideo, Uruguay, the Dudley Herbarium of Stanford University, and the Brooklyn Botanic Garden (Bk).

Aechmea dichlamydea Bak. var. **trinitensis**, var. nov., spicis omnibus brevissime crasseque stipitatis. Pl. I, fig. 3.

TRINIDAD: Epiphytic, Broad Walk, Trinidad Botanic Garden, Port of Spain, 1890, *J. H. Hart in Herb. Trin. 4089* (Trin, TYPE, phot. G; NY); 1889, *Broadway 3627* (Trin); indefinite, 1867, *Prestoe* (K); *Herb. Trin. 916* (Trin).

Canistrum (**Wittrockia**) **minutum** (Mez), comb. nov. *Nidularium minutum* Mez in Fedde Rep. Spec. Nov. xvi. 4 (1919). Pl. I, figs. 4–5.

While at Alto da Serra, the type locality of *Nidularium minutum*, I collected what I took from its habit to be a close relative of *Nidularium Scheremetiewii*. However, a dissection of the fresh flowers revealed that each petal bore two finely divided scales a short distance above the base, thus making it a *Canistrum*. Quite evidently it had

never been described under *Canistrum*, but its habit suggested that it might have been under *Nidularium* and its close correspondence to the description of *N. minutum* confirmed this surmise.

Canistrum minutum is most nearly related to *C. amazonicum*, from which it differs in its nearly symmetric evenly pale green sepals and narrower leaves.

BRAZIL: São Paulo: Estação Biologica, Alto da Serra, alt. 800–900 m., 1924, *D. Lemos in hb. S. P. 9480* (G, SP); 1929, *L. B. Smith, F. C. Hoehne & M. Kuhlmann 1829* (G); *J. King in hb. S. P. 24579* (G, SP).

Deuterocohnia Meziana O. Kuntze ex Mez emend. L. B. Smith, bracteis florigeris acutis vel obtusis: floribus distincte pedicellatis: sepalis suboblongis, late obtusis vel subtruncatis, asymmetricis. Mez in DC. Mon. Phan. ix. 465 (1896). *D. paraguariensis* Hassler in Ann. Conserv. & Jard. Bot. Genève, xx. 298 (1919). *D. divaricata* Mez in Fedde Rep. Spec. Nov. xvi. 9 (1919). Pl. I, figs. 1–2.

BRAZIL: Matto Grosso: Corumbá, 1892, *O. Kuntze* (NY, type; phot. G); same, rupicolous on calcareous rocks, 1911, *Hoehne 3543* (Mus. Nac. Rio). PARAGUAY: calcareous banks, Sierra de Amambay, Cerro Margarita, northern Paraguay, 1908, *Rojas 11098* (Gen, type of *D. paraguariensis*, phot. G; B (?), type of *D. divaricata*); Colonia Risso, 1896, *Anisits 2419* (S); Itapucúmi, 1893, *Lindman A 2097* (S); Puerto Fonciere, 1916, *Rojas 2270* (Hb. Osten).

Owing to the fact that the type of *Deuterocohnia Meziana* consisted of young material, the sepals were erroneously described as acuminate, but a careful dissection shows them to be nothing of the sort. All the differences which are to be inferred from the descriptions of *D. Meziana* and *D. paraguariensis* are nullified either by mistakes in the description of the former of by a consideration of the difference of condition. The type of *D. Meziana* is young material poorly preserved, while that of *D. paraguariensis* is a mature specimen excellently preserved.

Guzmania plicatifolia, spec. nov., epiphyta vel terrestris, acaulis, florifera ad 9 dm. alta: foliis 8 dm. vel ultra longis, minutissime obscureque lepidotis; lamina lineari, 2 cm. lata, longe acuminata, valde plicata: scapo 8 mm. diametro, erecto, mox glabro; scapi bracteis foliaceis, erectis, dense imbricatis: inflorescentia laxe bipinnata, e spicis ad 15 composita, subcylindrica, 3 dm. longa; bracteis primariis ovato-lanceolatis, amplis, membranaceis, mox disruptis, infimis quam spicae multo longioribus: spicis breviter crasseque stipitatis, crasse ovoideis, 4–5 cm. longis, dense 12–15-floris; bracteis florigeris imbricatis, late ellipticis vel ovatis, acutis, 25 mm. longis, sepala bene superantibus, membranaceis, prominenti-venosis, subglabris: floribus solum perjuvenilibus vel fructiferis cognitis, sub-

sessilibus; sepalis liberis, anguste lanceolatis, acutis, 16 mm. longis, glabris, sulcatis: capsula tenuiter ellipsoidea, sepala subaequanti. Pl. II, figs. 4–5.

COSTA RICA: San José: forests, La Palma, alt. 1459 m., 1898, *Tonduz 12533* (US, type; phot. G); Cartago: Jocosal, south of Cartago, alt. 1500 m., 1920, *Lankester K 39* (K).

This plant is quickly distinguished from the great majority of species of *Guzmania* by its strongly plicate leaves, but resembles its near relative, *G. calamifolia* André, in this particular as well as in its very thin bracts. It differs from *G. calamifolia* in its elongate inflorescence, broad primary bracts, and short stout spikes.

Guzmania rosea, spec. nov., acaulis, 4–5 dm. alta: foliis rosulatis, ad 6 dm. longis, supra glabris, subtus dense minuteque brunneo-lepidotis, exterioribus ad vaginas atro-brunneas reductis; laminis foliorum interiorum ligulatis, 25–30 mm. latis, late acutis, ex sicco concoloribus: scapo erecto, glabro; scapi bracteis dense imbricatis, late ellipticis, apice acuminatis, infimis omnino supremis solum apice lepidotis: inflorescentia simplicissima, laxa, 25 cm. longa: bracteis florigeris orbicularibus, sepala involventibus, apiculatis, roseis, ad apicem extremum lepidotis, infimis sepala subaequantibus, alteris quam sepala bene brevioribus: floribus patentibus, ad 5 mm. pedicellatis; sepalis glabris, 38 mm. longis, ad 25 mm. connatis, late obtusis, paulo asymmetricis; petalis 50 mm. longis, alte conglutinatis, ex sicco aureis, obtusis; stylo gracili, petala subaequanti, stamina paulo superanti, ovario tenuiter pyramidato. Pl. II, fig. 6.

COLOMBIA: El Valle: on rocks, Poreto on the Rio Dagua, *Lehmann K 362* (K); Cauca: Timbiqui, 1903, *Lehmann K 355* (K, type; phot. G).

The simple inflorescence and large high-connate sepals of this species place it near *G. musaica* (Linden) Mez, from which it is immediately distinguishable by its lax elongate inflorescence and concolorous leaf-blades.

Tillandsia (§ **Allardtia**) **Archeri,** spec. nov., epiphyta, acaulis, 27 cm. alta: foliis rosulatis, 2 dm. longis, utrinque dense adpresseque lepidotis; vaginis magnis, castaneis, late ovatis; laminis anguste triangularibus, acuminatis, basi 15 mm. latis, subtus cinereis: scapo erecto, gracili, quam folia paulo breviori; scapi bracteis foliaceis, internodia multo superantibus: inflorescentia ovoidea, subdense bipinnata, 7 cm. longa, fulgide rubra; bracteis primariis late ovatis, lepidotis, infimis longe caudatis, quam spicae axillares bene longioribus: spicis lanceolatis, subsessilibus, 5–6-floris, 25–30 mm. longis; bracteis

florigeris laxe imbricatis, rhachin vix obtegentibus, oblongo-ovatis, 12–15 mm. longis, quam sepala distincte longioribus, carinatis, apice incurvis, mox glabris, membranaceis, valde nervatis: floribus subsessilibus; sepalis oblongis, obtusis, 12 mm. longis, sparse lepidotis vel glabris, nervatis, posticis alte connatis; petalis oblongis, late obtusis, ca. 14 mm. longis; staminibus styloque inclusis. Pl. I, figs. 14–15.

COLOMBIA: ANTIOQUIA: Santa Elena, 1930, *W. A. Archer 1204* (US, TYPE; phot. G).

In the key in Mez's monograph this plant runs down to *T. compacta* from which it differs in its acuminate leaf-blades. In habit it more closely resembles *T. myriantha*, but differs in its highly connate posterior sepals. The spikes are suggestive of those of *T. rubella* and *T. oroyensis*.

Tillandsia flexuosa Sw. Authors have disagreed on the application of this name, but it seems best to use it in the sense of including the later *T. aloifolia* Hook. as a synonym. In the process of identifying and publishing on his West Indian collections, Swartz considered certain of his specimens to be identical with the plant figured by Jacquin in his Selectarum Stirpium Americanarum Historia t. 63, and doubtfully referred to *T. tenuifolia* L. Swartz recognized that Jacquin's plant was misdetermined and made the new name *T. flexuosa* for it. Unfortunately Swartz appears to have misapplied the name in identifying his own specimens, and this error has been used by some authors to give a different interpretation to the species and to reduce it to synonymy under *T. utriculata*. Such action would be justifiable had *T. flexuosa* been published as a new species, but it was obviously published as a new name and should take its significance from *T. tenuifolia* Jacq. which is generally admitted to be the same as *T. aloifolia* Hook.

Tillandsia (§ **Anoplophytum**) **latisepala**, spec. nov., caulescens, omnino argenteo-lepidotis: foliis dense quaquaverse dispositis, dense subpruinoseque lepidotis; vaginis inconspicuis; laminis patentibus, anguste triangularibus, 20–25 cm. longis, ad 17 mm. latis, ad apicem involutis: scapo gracili, erecto, leviter curvato, 15 cm. longo; scapi vaginis imbricatis, scapum omnino obtegentibus, ellipticis, longe caudatis: inflorescentia simplicissima, quaquaverse florigera, subdense ovoidea, 6 cm. longa: bracteis florigeris submembranaceis, latissime ovatis, sepala superantibus, infimis caudatis, 3 cm. longis, flores superantibus: floribus 22 mm. longis, subsessilibus; sepalis liberis, crasse coriaceis, 11 mm. longis, 9 mm. latis, apiculatis, dense pruinose-

que albido-lepidotis; petalis ex sicco albis, angustis, obtusis; filamentis prope apicem transverse plicatis; stylo elongato, e corollae fauce emergenti, stamina paulo superanti. Pl. I, figs. 6–7.

PERU: Cuzco: Valle de Santa Ana, Huadquina, alt. 1500 m., 1931, *F. L. Herrera 3313* (US, TYPE; phot. G).

This species is easily distinguished from its near relatives by its very broad thick-coriaceous sepals.

Tillandsia xiphioides Ker-Gawl. The following specimen constitutes the first Bolivian record for the species:

BOLIVIA: Potosi: prov. Nor-Chichas, on rocks near San Antonio, 1931, *M. Cardenas 93* (G).

Vriesia Alfarovii Mez. The discovery of additional material of this species necessitates a slight emendation of the original description and a large extension of range as follows:

Inflorescentia laxe paniculata; bracteis primariis eis scapi similibus, quam spicae axillares multo brevioribus; spicis lateralibus suberectis, ad 24 cm. longis, breviter stipitatis, basi a prophyllis 2 auctis, spica terminali basi a prophyllis multis scapi bracteis exacte similibus aucta.

COLOMBIA: El Valle: epiphytic, coastal thickets, Buenaventura, alt. 0–10 m., 1922, *Killip 11736* (G).

The Killip specimen is a very good match for the type material (*Tonduz 9883*, from Costa Rica) in the Gray Herbarium, but shows a larger proportion of the inflorescence. Had merely the terminal spike of the Killip specimen been collected, it would have appeared to be a simple inflorescence with a section of the scape, on account of its long sterile base. This, evidently, is just what happened in the case of the type material.

Vriesia Broadwayi, spec. nov., epiphyta, semimetralis: foliis 3 dm. longis; vaginis ellipticis, utrinque dense minuteque ferrugineo-lepidotis; laminis anguste lanceolatis, acuminatis, 2 cm. latis, supra glabris, subtus dissite lepidotis: scapo erecto, gracili; scapi bracteis dense imbricatis, dissite lepidotis, inferioribus foliaceis, superioribus late ellipticis, apiculatis, pallido-brunneis: inflorescentia simplici, racemosa, optime secunda, 7–9 cm. longa, laxe 5–7-flora, minutissime ferrugineo-lepidota; rhachi flexuosa; bracteis florigeris late ovatis, late acutis, brunneis, ad 22 mm. longis, quam sepala distincte brevioribus, cum floribus secunde versis: floribus crasse stipitatis; sepalis late ellipticis, rotundatis, 18 mm. longis, subcoriaceis, levissime nervatis, margine pallido excepto atro-brunneis; petalis ignotis: capsula subcylindrica, 35 mm. longa. Pl. I, figs. 9–10.

TRINIDAD: Heights of Aripo, 1922, *W. E. Broadway 9916* (Trin, TYPE; phot. G; K; NY), Mt. Tucuche, 1920, *N. L. Britton, Hazen & Mendelson 1258 in part* (G), 1929, *Broadway 7096* (K).

This species seems to be more nearly related to *V. oligantha* (Bak.) Mez than to any other known species. It differs in its finely ferruginous-lepidote narrower leaves and smaller sepals.

Vriesia Hoehneana, spec. nov., perconspicua, plerumque bimetralis vel ultra: foliis rosulatis, ad 5 dm. longis, dorso minutissime brunneo-lepidotis; vaginis magnis, late ellipticis, atro-castaneis; laminis ad 8 cm. latis, pallide viridibus, late acutis, apiculatis, venulis sinuosis transversalibus dense ornatis: scapo perelongato, basi ad 14 mm. diametro; scapi bracteis infimis foliaceis, quam internodia multo longioribus, supremis late lanceolatis, internodia subaequantibus: inflorescentia laxissime pauciramosa vel simplici; bracteis primariis eis scapi similibus, quam bases steriles spicarum multo brevioribus; spicis ad 28 cm. longis, 8–16-floris, in inflorescentia composita spicis lateralibus divergentibus, graciliter stipitatis, basi unibracteolatis vel nudis, spica terminali basi a bracteis multis scapi bracteis exacte similibus aucta; bracteis florigeris cum floribus secunde versis, ad 32 mm. longis, internodia subduplo aequantibus, suborbicularibus, latissime acutis vel apiculatis, ad apicem versus obtuse carinatis paulo incurvatisque, flavis, sublaevibus, minutissime obscureque brunneo-lepidotis: floribus bene secundis, ad 10 mm. stipitatis; sepalis ad 34 mm. longis, anguste ellipticis, utrinque sed praesertim intus minute brunneo-lepidotis; petalis citrinis, ad 5 cm. longis, basi ligulis binis magnis auctis; staminibus inclusis, filamentis ad apicem valde incrassatis. Pl. I, figs. 11–13.

BRAZIL: São Paulo: in campo, Alto da Serra, Estrada do Vergueiro, 1920, *F. C. Hoehne 4724* (G, SP); Campo Grande, 1924, *F. C. Hoehne 9478* (G, SP); in campo, Estação Biologica, Alto da Serra, alt. 800–900 m., 1929, *L. B. Smith 1945* (G, TYPE).

This species is a native of the open rolling campo, and when seen in the field is unmistakable on account of its extremely elongate scape and few-branched or simple inflorescence. The spikes and flowers closely resemble those of *V. hieroglyphica* and *V. tessellata*, but these both have many-branched inflorescences with the sterile base of the terminal spike no more elongate than in the lateral ones. In the long scape-like base of the terminal spike *V. Hochneana* resembles *V. Alfarovii*, but differs from that species in its much narrower sepals. The character of having the sepals strongly lepidote inside is a rather frequent one in the section *Xiphion* but has not been particu-

larly noted. The fine irregular cross-veining of the leaves is the same type as found in *V. platynema* and figured by Gaudichaud (Atl. Bonite, t. 66 (1846)).

In Mez's monograph this species runs down to *V. Tweediana*, but as shown further on in the present paper the name is quite evidently misapplied. Since no other name appears applicable to the specimens which Mez used in making his description of *V. Tweediana*, and since their description is the only one which does not show distinct differences from the above-cited specimens, it becomes necessary to erect a new species based on the recent material from São Paulo but quite probably including some of the specimens placed under *V. Tweediana* by Mez.

Hoehne has figured a small specimen of the species under the name of *V. tessellata* on page 97 of the Album da Secção de Botanica do Museu Paulista.

Vriesia Rodigasiana Morr. in Ill. Hort. xxix. 171, t. 467 (1882). *Tillandsia Tweediana* Bak. in Journ. Bot. xxvi. 138 (1888); Brom. 224 (1889). *Vriesia Tweediana* Mez in Mart. Fl. Bras. iii. pt. 3, 561 (1894).

Tillandsia Tweediana was founded on *Tweedie 1342* and *Glaziou 16467*. The Tweedie specimen is conspecific with *Vriesia Rodigasiana*, while the Glaziou specimen later became the type of *Vriesia friburgensis* Mez. In his choice of name Baker evidently considers the Tweedie specimen as the type, and Mez further strengthens this position by removing the only other number of the original citation. Thus it seems best to avoid confusion and let *Vriesia Tweediana* lapse into synonymy rather than to use it as antedating *V. friburgensis*.

Mez treated *V. Tweediana* as a valid species under the section *Xiphion*, disregarding the fact that the type shows the stamens longer than the petals and that Baker so described them. The reason for this confusion is not yet solved, but it may lie with the Sello specimens, which Baker added to this species in his Handbook of Bromeliaceae and which Mez retained. Certainly there is much in Mez's description which does not fit the type, and which leads one to believe that he wrote from other specimens which he thought conspecific.

Vriesia tucumanensis Mez. This species should include *V. caldasiana* Mez as a synonym. When the two species were originally described by Mez in De Candolle's Monographiae, they were supposedly distinguished by *V. tucumanensis* having the stamens exserted, and by *V. caldasiana* having them included. In all other respects they appear very similar. Examination of type material of *V. caldasiana*

(*Mosén 4436*) from the Riks Museum at Stockholm shows that the stamens, contrary to the description, are exserted quite definitely at anthesis. Mez evidently saw immature material only.

Any objections to the equality of the two species on the ground of the wide geographic separation of their type localities are answered by the number of intermediate stations which have recently come to light.

BRAZIL: MINAS GERAES: epiphytic, banks of the Rio Verde, Caldas, 1876, *Mosén 4436* (S, ISOTYPE of *Vriesia caldasiana;* phot. G); Pouzo Alegre, 1929, *Hoehne 24550* (G, SP); PARANÁ: Ponta Grossa, 1903, *Dusén 2699* (S); Morretes, 1904, *Dusén 4357 in part* (S); RIO GRANDE DO SUL: Silveira Martins, Val Veneta, 1893, *Lindman A 1331* (S). PARAGUAY: Villa Rica, 1893, *Lindman A 1793* (S); 1919, *Jörgensen 4489* (Dudley Hb.). ARGENTINA: JUJUY: near Laguna de la Brea, 1901, *Fries 382* (S); FORMOSA: indefinite, 1919, *Jörgensen 2803* (G); TUCUMAN: Sierra de Tucuman, 1882, *F. Schultz* (B, TYPE; phot. G); Yerba Buena, Naranjal, Dept. Tafi, 1918, *Schreiter 738, 27/2331 in hb. BA* (G, BA, Hb. C. Osten).

In establishing the name of this species, *V. tucumanensis* has been selected rather than *V. caldasiana,* because it appears earlier in the same work and still more because it was the one to be described correctly as regards the stamens.

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2. THE BROMELIACEAE OF TRINIDAD AND TOBAGO.

By W. E. Broadway and L. B. Smith.

In the following treatment the authors feel that they have employed a very satisfactory means of combining and correlating the field and herbarium studies of tropical plants. One contributes a knowledge of local conditions, geography, climate and history, and the characters of the plants which are lost in herbarium specimens. The other supplies the information gained from the study of the wide range of specimens and literature to be found only in the larger herbaria, thus correlating local and general information. By keeping in close touch they are able to answer questions in a short time that would require years for either one alone.

The senior author's interest in the *Bromeliaceae* dates from his experiences as a student-gardener at Kew when he had charge of the living material to which the late J. G. Baker was constantly referring in the preparation of his "Handbook of the Bromeliaceae." Since then in coming to the West Indies and most particularly to Trinidad he has continued to collect and study the family, discovering a number

of rare or new species in the process. The junior author's article on "The *Bromeliaceae* of British Guiana."[1] suggested the present treatment as a natural sequel.

The island of Trinidad ranks very high in tropical America for the thoroughness of its botanical exploration. Few of the West Indies can compare with it in this regard and Gleason in his survey "The progress of botanical exploration in tropical South America"[2] rates it as one of twelve restricted regions which are considered as adequately known. Consequently it is not surprising that the present article required the description of but two novelties, although a number of previously described species have been added to the flora. Tobago is distinctly less known than Trinidad and has only about a third as many recorded species of *Bromeliaceae*. However, the much more uniform topography and smaller area of Tobago make it seem unlikely that further collecting will greatly affect this difference between the two island floras.

The two striking regional features of the Trinidad *Bromeliaceae* are the strong development of the genus *Bromelia* on the Bocas Islands and Patos between the northwest corner of Trinidad and Venezuela, and the localizing of the rare *Glomeropitcairnia erectiflora* and most of the Trinidad endemics, *Vriesia Broadwayi*, *V. stenostachya*, *Gravisia aripensis* and *Aechmea porteoides*, in the rain-forest of the mountainous north coast. The two remaining Trinidad endemics, *Tillandsia subulifera* and *Aechmea dichlamydea* var. *trinitensis* are still too imperfectly known to be said to characterize any particular region, and as yet no other strong local tendencies have been observed in the non-endemic species.

Slightly less than half of the species of Trinidad and Tobago reappear in Venezuela, but this is explained largely by the relative lack of botanical exploration in the latter country. There are a large number of species which seem to have come south from the other Antilles and about an equal amount from Brazil and the Guianas.

The great majority of the species in this treatment have already found favor in cultivation. Several were grown over one hundred years ago, and the introduction of *Bromelia chrysantha* in Europe dates before 1797. So far as known the following species have not yet been tried by the horticulturists: *Glomeropitcairnia erectiflora*, *Tillandsia subulifera*, *tricica*, *micrantha*, *subimbricata*, *rubra*, *didistichoides* and *complanata*, *Vriesia stenostachya*, *macrostachya*, *Broadwayi*, *albi-*

[1] Contrib. Gray Herb. lxxxix. 46 (1930).
[2] Bull. Torr. Bot. Club, lix. 21 (1932).

flora and *procera*, *Guzmania megastachya*, *Catopsis Berteroniana* and *sessiliflora*, *Hohenbergia oligosphaera* and *Aechmea portcoides*, although their attractive or bizarre appearance, as indicated in their descriptions, strongly recommends them. For the most part they are very rare or local species and have thus escaped attention, but it seems strange that no record can be found of the cultivation of such a widespread and striking species as *Tillandsia rubra*.

The generic sequence of Harms[1] has been adopted for the present work since it shows better than any other system the natural development from simple to complex forms. However, it has seemed best to retain the broader generic limits indicated by Mez in such cases as *Bromelia*, *Vriesia* and *Guzmania*.

The general acknowledgements and the abbreviations of herbaria cited are to be found on page 145. The authors are particularly indebted to Prof. Gunnar Samuelsson of the Riks Museum at Stockholm, to Mr. J. E. Dandy of the British Museum of Natural History and to Mr. N. Y. Sandwith of the Royal Botanic Gardens at Kew for their aid in settling troublesome questions on the identity of types.

BROMELIACEAE J. St.-Hil. Herbs or rarely shrubby perennials, mostly epiphytic. Leaves spirally arranged, usually basal, dilated-sheathing below, simple, entire or spinulose-serrate, bearing peltate scales, at least when young, and these serving to hold moisture. Inflorescence simple or paniculate, of spikes or racemes, usually bearing brightly colored conspicuous bracts. Flowers perfect in all the species of Trinidad and Tobago. Perianth heterochlamydeous, the segments free or variously joined. Stamens 6, filaments free or joined to the petals or to each other. Style 3-parted. Ovary inferior to superior, 3-celled. Fruit capsular or baccate. Seeds naked, winged, or plumose. Embryo small, situated at the base of the copious mealy endosperm. About 50 genera and 1500 species, strictly confined to tropical and subtropical America.—Expos. Famil. i. 122–5, t. 19 (1805); Beer, Fam. Brom. 1–271 (1857); Benth. & Hook. f. Gen. iii. 657–670 (1883); Wittm. in Engler & Prantl, Nat. Pflanzenf. ii. Abt. 4, 32–59 (1887–8); Bak. Handb. Brom. 1–243 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 173–634 (1891–4); Mez in DC. Mon. Phan. ix. 1–990 (1896); Harms in Engler & Prantl, Nat. Pflanzenf. ed. 2, xv a. 65–159 (1930).

[1] Harms in Engl. & Prantl, Nat. Pflanzenf. 2 Aufl., xv a. 65 (1930).

Key to Genera.

1. Ovary wholly or in part superior: fruit a capsule: seeds variously appendaged.
   2. Seeds with an entire caudate appendage at each end, not plumose: leaves often somewhat spinulose-serrate: ovary only part superior.....Subfamily *Pitcairnioideae*.
      1. *Pitcairnia*.
   2. Seeds plumose: leaves always entire.....Subfamily *Tillandsioideae*.
      3. Seeds plumose at both ends: ovary only half superior.
         Tribe *Glomeropitcairnieae*.
         2. *Glomeropitcairnia*.
      3. Seeds plumose only at base or apex: ovary wholly or almost wholly superior.....Tribe *Tillandsieae*.
         4. Plume of the mature seed straight: sepals symmetric or if asymmetric then the spikes distichous-flowered.
            5. Petals free: inflorescence of one or more distichous-flowered spikes, if rarely polystichous then simple and the leaves long-acuminate.
               6. Petals naked.....3. *Tillandsia*.[1]
               6. Petals each bearing 2 scales at base.....4. *Vriesia*.[1]
            5. Petals joined or closely agglutinated: inflorescence always of polystichous-flowered spikes.....5. *Guzmania*
         4. Plume of the mature seed folded over: sepals strongly asymmetric: inflorescence of polystichous-flowered spikes.....6. *Catopsis*.
1. Ovary wholly inferior: fruit baccate, fleshy to coriaceous: seeds naked: leaves usually spinulose-serrate..Subfamily *Bromelioideae*.
   7. Pollen grains entire, bearing neither pores nor longitudinal folds: margins of the petals free, petals connected by the filaments.....7. *Bromelia*.
   7. Pollen grains variously sculptured: petals not connected by the filaments.
      8. Pollen grains bearing pores: stamens usually included at anthesis: sepals mostly mucronate.
         9. Petals naked.
            10. Ovules few in each cell: inflorescence loosely paniculate: flowers not over 5 mm. long.....8. *Araeococcus*.
            10. Ovules many in each cell.
               11. Flowers in a number of very dense cone-like spikes.
                  9. *Hohenbergia*.[2]
               11. Flowers in elongate lax spikes in an open inflorescence.
                  10. *Wittmackia*.
         9. Petals each bearing 2 scales on the inner surface.
            12. Fruits and bracts always remaining distinct.
               13. Pollen grains bearing many (more than 5) pores: inflorescence compound: flowers in dense fascicles with only the petals exserted from the bracts.....11. *Gravisia*.
               13. Pollen grains bearing either 2 or 4 pores.....12. *Aechmea*.

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[1] See artificial key on page 159 for the identification of specimens without good flowers.

[2] Without good flowers *Hohenbergia oligosphaera* is apt to be confused with *Gravisia aquilega*, but it may be distinguished by its floral bracts which are suborbicular to broadly ovate and abruptly contracted to an acuminate apex (Pl. I, fig. 8) instead of ovate, abruptly acute, and mucronate.

12. Fruits and bracts of the inflorescence coalescing at maturity to form a compound fruit.....13. *Ananas.*
8. Pollen grains bearing longitudinal folds: stamens exserted at anthesis: sepals obtuse or acute, never mucronate: flowers 6–8 cm. long.....14. *Billbergia.*

1. **PITCAIRNIA** L'Hérit.

Plants usually stemless. Leaves fasciculate, entire or spinulose-serrate, sheath small, often bulbous-thickened, blade linear to lanceolate with definite petiole, sometimes dimorphic with some blades reduced to horny spinulose-serrate spines. Inflorescence simple or compound, racemose. Sepals free, acute but never mucronate. Petals free, usually zygomorphic, naked or with a single triangular scale at base. Stamens equaling or shorter than the petals, anthers linear, versatile. Ovary usually superior for most of its length, style filiform, equaling the petals. Ovules many. Capsule septicidal or rarely indehiscent. Seeds appendaged at either end or rarely with a dorsal wing.—Sert. Angl. 7, t. 11 (1788).

About 170 species. Terrestrial or saxicolous, rarely epiphytic. Mexico, Central America, the Antilles and South America south to northern Argentina.

1. **P. integrifolia** Ker-Gawl. Half a meter high: leaves all alike, 7 dm. long, 13–18 mm. broad, white-lepidote beneath, strongly constricted between the sheath and the blade, the outermost ones slightly serrulate near the base: scape slender, straight, its bracts triangular, with long filiform tips: inflorescence laxly bipinnate, pyramidal, sparingly furfuraceous-lepidote to glabrous: floral bracts lanceolate, acute, mostly shorter than the slender flower-pedicels: flowers 35–40 mm. long; sepals narrowly triangular, acuminate, 10–12 mm. long; petals yellow at base and bearing a scale, the remainder bright red; ovary about 2/3 superior: capsule broadly fusiform.—Ker-Gawl. in Bot. Mag. xxxvi. t. 1462 (1812).

TRINIDAD: Botanic Gardens, St. Ann's, 1930, *Broadway 7434* (G); Fort George Hill, Cocorite, 1903, *J. R. Johnston 109* (G); cliff, Carenage, *Britton & Hazen 233* (G, NY); coastal rocks, Chaguaramas, 1921, *N. L. Britton 2715* (NY); Hort. Trin., 1890, *Herb. Trin. 4362* (Trin); Monos Island, 1917, *R. O. Williams* (Trin); Tetron Bay, 1927, *Broadway 6776* (Mo); 1928, *Broadway 6887* (Mo).

[Endemic? The source of the type is obscure; the only definite records are from Trinidad.]

2. **GLOMEROPITCAIRNIA** Mez.

Large stemless herbs, with rosulate, linear, entire leaves. Scape elongate, erect. Inflorescence of sessile or short-stipitate heads or

short spikes, bipinnate or tripinnate. Flowers perfect. Sepals free, subsymmetrical. Petals free, bearing one or two scales at base. Stamens included. Ovary about half inferior. Capsule imperfectly dehiscent. Seeds with pappiform coma at both ends.—Bull. Herb. Boiss. ser. 2, v. 232 (1905).

Two species. Lesser Antilles, Trinidad, Island of Margarita (to Venezuela).

1. **G. erectiflora** Mez. Plant 1–2 m. high: leaves many, 7 dm. long, 8 cm. broad, acute but soon rounded by withering: scape stout, much exceeding the leaves: inflorescence bipinnate with erect or ascending spikes, interrupted-thyrsoid, red, glabrous; primary bracts suberect, coriaceous, elliptic, rounded-apiculate, shorter than the axillary spikes: spikes erect or nearly so, subovoid, the lower short-stipitate; floral bracts elliptic, rounded, mucronate, ecarinate, shorter than the sepals: flowers sessile, erect; sepals sublanceolate, carinate, 21–28 mm. long.—Bull. Herb. Boiss. ser. 2, v. 233 (1905); L. B. Smith in Contrib. Gray Herb. xcv. 42, t. x, figs. 6–7 (1931). Pl. II, figs. 11–12.

TRINIDAD: Mt. Tucuche, summit, 1893, *Broadway 5250* (Trin, G, NY); 1925, *Broadway 5660* (FM); 1929, *Broadway 5660, 7129* (K); 1931, *Broadway 7461* (G).

[Island of Margarita.]

Epiphytic.

3. **TILLANDSIA** L.

Caulescent or acaulescent herbs, habit very variable. Leaves rosulate or fasciculate or evenly distributed along a stem, polystichous or distichous, entire, usually subtriangular or ligulate. Scape usually distinct. Inflorescence various, usually of distichous spikes, if spikes polystichous then single, rarely reduced to a single flower. Flowers perfect. Sepals usually symmetric, free, or equally or posteriorly joined. Petals free, naked. Stamens of various lengths relative to the petals and to the pistil. Ovary superior, glabrous. Ovules usually many and caudate. Capsule septicidal. Seeds erect, narrowly cylindric or fusiform, coma white, straight.—Sp. Pl. 286 (1753).

About 350 species. Tropical and subtropical America, from the southern United States, Mexico and the Antilles, to central Argentina and Chile.

Key to Species.

1. Stamens exserted, longer than the petals.....§ *Platystachys.*
   2. Floral bracts remote, equaling or shorter than the internodes: spikes elongate.

3. Flowers and bracts erect, appressed to the rhachis....1. *T. utriculata.*
3. Flowers and bracts spreading.....2. *T. flexuosa.*
2. Floral bracts usually more or less imbricate, always distinctly longer than the internodes: spikes not elongate.
4. Leaves fasciculate with filiform blades: inflorescence of several spikes crowded into a dense head or reduced to a single polystichous-flowered spike.....3. *T. juncea.*
4. Leaves rosulate: inflorescence of distinct spikes or of a single distichous-flowered spike.
5. Floral bracts densely imbricate, wholly concealing the rhachis, glabrous or nearly so.....4. *T. fasciculata.*
5. Floral bracts rather lax, concealing the rhachis little or not at all.
6. Floral bracts equaling or exceeding the sepals.
7. Floral bracts subglabrous: leaf-sheaths scarcely or not at all inflated.....5. *T. canescens.*
7. Floral bracts densely lepidote: leaf-sheaths strongly inflated.....6. *T. bulbosa.*
6. Floral bracts distinctly shorter than the sepals, very lax. 7. *T. subulifera.*

1. Stamens included, shorter than the petals.
8. Sepals strongly asymmetric, oblong or obovate, free. § *Pseudo-Catopsis.*
9. Inflorescence bipinnate, spikes 8 cm. long or more: floral bracts 7 mm. long.....8. *T. triticea.*
9. Inflorescence tripinnate or if bipinnate the spikes not over 6 cm. long: floral bracts scarcely over 4 mm. long. 9. *T. micrantha.*

8. Sepals symmetric, ovate or lanceolate.
10. Style elongate, equaling or exceeding the stamens: inflorescence always of distichous spikes.....§ *Allardtia.*
11. Plants 1–2 m. high: inflorescence of many pinnately arranged spikes.
12. Plant slender: spikes linear in outline, 12 mm. wide. 10. *T. subimbricata.*
12. Plant stout, often 2 m. high: spikes lanceolate in outline, 50 mm. wide.....11. *T. rubra.*
11. Plants much smaller: inflorescence simple or of digitately arranged spikes.
13. Inflorescence single, terminal, digitate.....12. *T. didistichoides.*
13. Inflorescences several, each a single spike on a long slender scape arising from the axil of a rosette-leaf.....13. *T. complanata.*
10. Style shorter than the stamens or else the inflorescence simple and polystichous.
14. Stamens emerging from the throat of the corolla: filaments transversely plicate.....§ *Anoplophytum.*
15. Inflorescence simple and polystichous.
16. Sepals equally subfree.....14. *T. stricta.*
16. Sepals much connate posteriorly.....15. *T. pulchella.*
15. Inflorescence digitate-compound: spikes distichous-flowered.....16. *T. Gardneri.*
14. Stamens deeply included.
17. Petal-blades broad and conspicuous, large.....§ *Phytarrhiza.*
18. Spike lax: floral bracts spreading, not at all imbricate. 17. *T. monadelpha.*

18. Spikes dense: floral bracts imbricate and concealing the rhachis.
    19. Floral bracts green or light rose, drying light: petal-blades elliptic . . . . . 18. *T. anceps.*
    19. Floral bracts deep rose, drying dark: petal-blades large, suborbicular . . . . . 19. *T. Morreniana.*
17. Petal-blades narrow, small: leaves subulate, distichous. § *Diaphoranthema.* 20. *T. usneoides.*

ARTIFICIAL KEY TO THE SPECIES OF TILLANDSIA AND VRIESIA FOR THE IDENTIFICATION OF MATERIAL WITHOUT GOOD FLOWERS.

1. Spikes with flowers distichous or secund, or else the inflorescence reduced to a single flower.
    2. Sepals asymmetric, oblong or obovate, free, not over 10 mm. long.
        3. Inflorescence bipinnate, spikes 8 cm. long or more: floral bracts 7 mm. long . . . . . 8. *T. triticea.*
        3. Inflorescence tripinnate or if bipinnate the spikes not over 6 cm. long: floral bracts scarcely over 4 mm. long. 9. *T. micrantha.*
    2. Sepals symmetric, ovate or lanceolate.
        4. Flowers strongly secund.
            5. Inflorescence simple, few-flowered: floral bracts broadly acute, shorter than the sepals . . . . . 6. *V. Broadwayi.*
            5. Inflorescence usually compound: floral bracts acuminate, longer than the sepals . . . . . 9. *V. paniculata.*
        4. Flowers not at all secund.
            6. Plant moss-like: inflorescence reduced to a single flower which soon becomes pseudo-axillary . . . . . 20. *T. usneoides.*
            6. Plant not at all moss-like: inflorescence several- to many-flowered.
                7. Flowers spreading at anthesis and after.
                    8. Inflorescence pendulous, simple: floral bracts shorter than the sepals . . . . . 3. *V. simplex.*
                    8. Inflorescence erect.
                        9. Leaf-blades lorate: plants 1 m. or more high: scape-bracts foliaceous.
                            10. Inflorescence simple, many-flowered: rhachis very stout . . . . . 5. *V. macrostachya.*
                            10. Inflorescence compound: rhachis slender . . . . 8. *V. procera.*
                        9. Leaf-blades narrowly triangular: upper scape-bracts not at all foliaceous.
                            11. Floral bracts equaling or shorter than the internodes: inflorescence usually compound: sepals 22 mm. long . . . . . 2. *T. flexuosa.*
                            11. Floral bracts distinctly longer than the internodes: inflorescence simple: sepals 13 mm. long . . . . . 17. *T. monadelpha.*
                7. Flowers spreading only in so far as they are forced to make room for those directly above them.
                    12. Floral bracts equaling or shorter than the internodes: inflorescence and spikes very lax . . . 1. *T. utriculata.*
                    12. Floral bracts distinctly longer than the internodes.

13. Inflorescence simple or digitately compound from a few spikes.
14. Floral bracts equaling or exceeding the sepals.
15. Inflorescences several, each a single spike on a long slender scape arising from the axil of a rosette-leaf . . . . . 13. *T. complanata.*
15. Inflorescence single, terminal.
16. Leaf-blades lorate.
17. Floral bracts up to 7 cm. long. 2. *V. longibracteata.*
17. Floral bracts 35 mm. long . . . . 4. *V. chrysostachys.*
16. Leaf-blades narrowly triangular to filiform.
18. Leaf-sheaths broadly ovate, conspicuous, several times broader than the blades.
19. Sepals much connate posteriorly.
20. Floral bracts subglabrous: leaf-sheaths scarcely or not at all inflated . . . . . 5. *T. canescens.*
20. Floral bracts densely lepidote: leaf-sheaths strongly inflated. 6. *T. bulbosa.*
19. Sepals equally sub-free . . . . 12. *T. didistichoides.*
18. Leaf-sheaths inconspicuous, rarely more than twice as broad as the blades.
21. Spikes crowded into a dense head.
22. Leaf-blades filiform: leaves ferruginous at base . . . . . 3. *T. juncea.*
22. Leaf-blades narrowly triangular: leaves cinereous throughout. 16. *T. Gardneri.*
21. Spikes distinct or only a single spike.
23. Posterior sepals much connate: upper scape-bracts filiform-caudate: leaf-sheaths evenly ferruginous . . . . . 4. *T. fasciculata.*
23. Posterior sepals free: upper scape-bracts acute: leaf-sheaths longitudinally red and green striped.
24. Floral bracts green or light rose, drying light . . . . . 18. *T. anceps.*
24. Floral bracts deep rose, drying dark . . . . . 19. *T. Morreniana.*
14. Floral bracts distinctly shorter than the sepals, very lax . . . . . 7. *T. subulifera.*
13. Inflorescence amply paniculate from a number of pinnately arranged spikes.
25. Spikes 12 mm. wide, narrowly linear: leaf-blades narrowly triangular . . . . . 10. *T. subimbricata.*
25. Spikes much broader: leaf-blades lorate.
26. Floral bracts twice as long as the sepals. 1. *V. stenostachya.*
26. Floral bracts but slightly exceeding the sepals.
27. Spikes narrowly oblong, suberect . . . . 7. *V. albiflora.*
27. Spikes lanceolate, spreading or reflexed. 11. *T. rubra.*

1. Spike polystichous-flowered: inflorescence simple.
28. Floral bracts coriaceous.....3. *T. juncea.*
28. Floral bracts membranaceous.
29. Sepals equally sub-free.....14. *T. stricta.*
29. Sepals much connate posteriorly.....15. *T. pulchella.*

1. **T. utriculata** L. One to two meters high: leaves densely rosulate, minutely punctulate-lepidote; sheaths large, ovate; blades narrowly triangular, subulate-acuminate, 50 mm. broad at base: scape erect, its bracts ovate, caudate to obtuse, rather remote: inflorescence lax, amply paniculate or rarely simple; primary bracts small, resembling the upper scape-bracts; spikes laxly 6–14-flowered, elongate, ascending, bearing several sterile bracts at base; floral bracts remote, ovate, acute or obtuse, glabrous, nerved, much shorter than the sepals: flowers erect, up to 40 mm. long; sepals equally subfree, obtuse, 18 mm. long, glabrous, nerved, ecarinate; petals white, tubular, erect, much exceeding the sepals; stamens and style slender, much exceeding the petals: capsule 35 mm. long, erect.—Sp. Pl. 286 (1753).

TRINIDAD: Tabaquite, near El Paraiso, 1917, *Broadway 8950* (Trin); Hort. Trin., 1890, *Broadway 4407* (Trin); St. Ann's on tall Saman trees, 1923, *Broadway 5165* (FM, Mo); Arima, 1906, *Dannouse* (Trin); Chaguanas, 1844, *Herb. Trin. 1750 in part* (Trin); indefinite, *Broadway 2380, 2631b, Fendler 815* Mez!); *Herb. Trin. 2010* (Trin); 1921, *L. H. & E. Z. Bailey* (NY). TOBAGO: Government House grounds. 1910. *Broadway 3400* (FM, Mo), *3640* (FM, NY); indefinite, *Broadway 3056* (Mez!).
[Florida, Mexico, Antilles, Venezuela.]

Epiphytic.

2. **T. flexuosa** Sw. (Cf. p. 148). Stemless, 1 m. high or often less: leaves densely rosulate, 4–5 dm. long, sheaths large, ovate, forming an ellipsoid pseudo-bulb, blade narrowly triangular, 25 mm. broad, often transversely banded: scape slender, erect, glabrous, its bracts elliptic: inflorescence simple or laxly bipinnate: primary bracts lanceolate, small: spikes lax; rhachis slender, flexuous, strongly flattened opposite the flowers; floral bracts elliptic-acute, nerved, shorter than the sepals: flowers remote, spreading, short-stipitate, 45–55 mm. long, white, rose, or purple; sepals free, obtuse, 22 mm. long; stamens and style exserted: capsule slenderly cylindric, 5–9 cm. long.—Prodr. 56 (1788). *T. aloifolia* Hook. Exot. Fl. iii. t. 205 (1827).

TRINIDAD: San Fernando, 1873, *Herb. Trin. 2011* (Trin); Gasparee, 1861, *Herb. Trin. 846* (Trin); Lapeyrouse Cemetery, Port of Spain, 1930, *Broadway* (G); San Juan, 1927, *Broadway 6782* (S); Chacachacare, 1921, *Broadway 10571* (Trin); Hort. Trin., 1888, *Broadway 2423* (Trin); same, 1890, *Broadway 4406* (Trin); Erin, 1915, *Broadway 7337* (Trin); L'Islet, near Chatham, 1916, *Broadway 8649* (Trin); Icacos, near St. Quinton, 1915, *Broadway 7372* (Trin); Patos, 1921, *Broadway* (Trin); the Savannah, Port of Spain, 1906, *Hart*

(Trin); indefinite, *Herb. Trin. 609* (Trin); 1919, *Broadway* (Trin, G, NY); 1915, *Broadway* (NY); *De Schach* (Mez!); *Broadway 2805, 3232* (Mez!). TOBAGO: Calder Hall road on hedge shrubs, 1914, *Broadway 4746* (G, Mo); indefinite, *Eggers 5667* (Mez!); *Broadway 4804* (Mez!).

[Florida, the Antilles, Central America, Colombia, Venezuela, British and Dutch Guiana.]

Epiphytic.

3. **T. juncea** (R. & P.) LeC. Stemless, up to 35 cm. high, sometimes propagating by stolons: leaves densely fasciculate, subulate; sheaths triangular, ferruginous-tomentose-lepidote; blades erect, filiform, channelled: scape erect, its bracts ovate, long-caudate, densely imbricate: inflorescence short, compact, of a few densely massed distichous spikes, or sometimes reduced to a single polystichous spike; primary bracts like the scape-bracts, mostly shorter than the axillary spikes: spikes erect, sessile, lanceolate in outline, stout; floral bracts ovate, densely imbricate, carinate, even, lepidote, exceeding the sepals, coriaceous: flowers erect, 40 mm. long; sepals lanceolate, glabrous, even, about 21 mm. long, posterior ones connate for 1/3 their length; petals tubular-erect, violet; stamens and style exserted: capsule 30 mm. long, cylindric.—LeC. in Ann. Lyc. Nat. Hist. N. Y. ii. 130 (1828). *Bonapartea juncea* R. & P., Fl. Peruv. iii. 38, t. 262 (1802).

TRINIDAD: Queen's Park Savannah, Port of Spain, 1931, *Broadway* (G); Caura, Valley of Tumbasson, 1928, *F. C. Buthn 11976* (Trin); St. Ann's, 1894, *Broadway 5501* (Trin); Arima, 1906, *Dannouse* (Trin, NY); indefinite, *Fendler 825, Broadway 2824* (Mez!).

[Antilles and Mexico to Venezuela and Peru.]

Epiphytic.

4. **T. fasciculata** Sw. Very variable, the Trinidad specimens belonging to the typical form: leaves rosulate, 2–6 dm. long, densely and minutely pale-appressed-lepidote; sheaths ovate, castaneous; blades narrowly triangular, acuminate, involute: scape stout, erect, its bracts leaf-like, densely imbricate: inflorescence (in the Trinidad specimens) of 1–5 large subsessile spikes digitately arranged; primary bracts like the upper scape bracts: spikes lanceolate in outline, thick, somewhat compressed; floral bracts ovate, acute, 35–50 mm. long, exceeding the sepals, glabrous or nearly so, carinate at apex, densely imbricate: flowers erect, subsessile; sepals lanceolate, mucronate-acute, glabrous, 27 mm. long, carinate, much joined posteriorly; petals violet, tubular-erect; stamens and style exserted.—Prodr. 56 (1788).

TRINIDAD: St. Ann's, 1907, *Broadway 2653* (FM); 1923, *5166* (FM, Mo); Quare River forests, 1931, *Broadway* (G); near no. 6 bridge, Cumuto Road, Cumuto, 1931, *Broadway 7716* (G); Tabaquite, 1918, *Broadway* (NY); Arima,

1902 and 1906, *Dannouse* (Trin); the Savannah, Port of Spain, 1906, *A. Fredholm* (Trin); San Fernando, 1873, *Herb. Trin. 2006* (Trin); indefinite, *Broadway 3234* (Mez!). TOBAGO: Mason Hall River, 1913, *Broadway* (NY); Adelphi, 1913, *Broadway* (G); indefinite, *Broadway 4285* (Mez!).
[Florida, the Antilles and Mexico to Dutch Guiana and Colombia.]

Epiphytic, saxicolous, or terrestrial.

5. **T. canescens** Sw. Stemless, about 2 dm. high: leaves utriculate-rosulate, equaling or exceeding the inflorescence, densely appressed-lepidote; sheaths conspicuous, broadly ovate, castaneous; blades narrowly triangular, involute-subulate, cinereous: scape erect or ascending, its bracts broadly ovate, inflated, long-caudate: inflorescence of a few digitately arranged spikes; primary bracts like the upper scape-bracts, shorter than the spikes: spikes lanceolate in outline, compressed, few-flowered; floral bracts ovate, strongly carinate, glabrous, strongly nerved, reddish, equaling or exceeding the sepals: flowers erect; sepals much connate posteriorly, 14–17 mm. long, elliptic, carinate, glabrous, even; petals violet, twice as long as the sepals; stamens and style exserted: capsule 28 mm. long, cylindric.—Sw. Prodr. 57 (1788).

TRINIDAD: indefinite, *De Schach* (Baker!).
[Antilles.]

Epiphytic.

6. **T. bulbosa** Hook. Stemless, 3 dm. high or usually much less: leaves inflated, bulbous-rosulate at base, blade involute-subulate: scape erect, its bracts elliptic with long blades exceeding the inflorescence: inflorescence simple or digitate from a few spikes: spikes lanceolate, densely 5–8-flowered, compressed, 5 cm. long; floral bracts ovate-acute, 15 mm. long, exceeding the sepals, densely lepidote, coriaceous: flowers erect, 3 cm. long, sessile; sepals glabrous, joined posteriorly; petals violet; stamens and style exserted: capsule cylindric, 4 cm. long.—Exot. Fl. iii. t. 173 (1827).

TRINIDAD: Tabaquite, 1918, *Broadway* (G, NY); Tamana, 1915, *Broadway 7895* (Trin); Moruga, Edward Trace, 1916, *Broadway 8205* (Trin); Quare River forests, 1931, *Broadway* (G); indefinite, *Fendler 823, 824* (Mez!); *Broadway 2196, 3237* (Mez!). TOBAGO: indefinite, *Eggers 5570* (Mez!); *Broadway 4287* (NY).
[Mexico and the Antilles to Colombia and eastern Brazil.]

Epiphytic.

7. **T. subulifera** Mez. Stemless, 15 cm. high: leaves few in an elongate pseudo-bulb, concolorous, 13 cm. long; blades linear, 5 mm. wide, angular-folded, subulate, erect, rigid, appressed-canescent-lepidote: scape erect, its bracts coriaceous, appressed-lepidote, the

upper ones not at all caudate: inflorescence erect, simple, distichous, 4-flowered, about equaling the leaves, 50 mm. long; axis slender, geniculate; floral bracts thickly coriaceous, strongly nerved, carinate, incurved, 20 mm. long, shorter than the sepals, densely appressed-canescent-lepidote: flowers erect or nearly so, 32 mm. long, yellow or white in the dried specimen; sepals 22 mm. long, narrowly obtuse, free, coriaceous, lepidote like the bracts; petals tubular-erect, stamens and style exserted: capsule 6 cm. long.—Mez in Fedde Rep. Spec. Nov. xvi. 74 (1919).

TRINIDAD: by Longdenville, *Broadway 4200* (B, TYPE).

8. **T. triticea** Burch. Stemless, 4–7 dm. high: leaves 3 dm. long, densely and minutely appressed-lepidote, usually dark-spotted, 3 cm. broad above the broadly ovate dark brown sheath, abruptly acute, apiculate: scape erect, glabrous, its bracts narrowly ovate, acute, exceeding the internodes: inflorescence distichous, laxly bipinnate, glabrous, 2–3 dm. long; primary bracts lanceolate, much shorter than the spikes: spikes linear, 20–30-flowered, 8 cm. long or more, spreading, rhachis slender, flexuous; floral bracts broadly ovate, acute, 7 mm. long, equaling the sepals, not imbricate, glabrous, even: flowers sessile, suberect; sepals obovate, asymmetric; petals yellowish; stamens included: capsule narrowly cylindric.—Burch. in Journ. Bot. xxvi. 42 (1888).

TRINIDAD: Mt. Tucuche, 1920, *Britton, Coker & Rowland 1323 in part* (NY).

[British Guiana, Brazil, Bolivia, Peru.]

Epiphytic.

9. **T. micrantha** Bak. Stemless, 4 dm. high; leaves 3–4 dm. long; sheaths large, elliptic, brown; blade lingulate, rounded-apiculate, 3–4 cm. broad, often irregularly purple-spotted: scape slender, erect or ascending, its bracts ovate-lanceolate, acuminate to rounded-apiculate, shorter than or equaling the internodes: inflorescence lax, tripinnate or bipinnate with the primary branches not over 6 cm. long; axis flexuous; primary bracts like the upper scape-bracts: spikes laxly 10–25-flowered, 5–10 mm. broad; floral bracts ovate-acute, convex, ecarinate, 4–5 mm. long, about equaling the sepals, not imbricate, sparsely punctulate-lepidote: flowers suberect, sessile, 2–4 mm. apart, not touching at maturity, much exceeding the internodes; sepals obovate, sparsely punctulate-lepidote or glabrous, even; petals white, slightly exceeding the sepals; stamens deeply included, exceeding the pistil, anthers ovoid, mucronate.—Bak. in Journ. Bot. xxv. 303 (1887),

not *T. micrantha* Bak. Bull. Torr. Bot. Club, xxix. 698 (1902), published as a new species in spite of the previous use of the name for a perfectly valid species; L. B. Smith in Contrib. Gray Herb. xcv. 45, t. ix, figs. 5–9 (1931).

TRINIDAD: Mt. Tucuche, 1920, *Britton, Coker & Rowland 1323 in part* (G); 1922, *Freeman & Williams 10088* (Trin); Heights of Aripo, 1922, *Broadway 9912* (Trin, NY); Mt. Tamana, 1925, *Broadway* (FM); indefinite, 1877–80. *Fendler 818* (K, TYPE; phot. G).

[Venezuela.]

Epiphytic.

10. **T. subimbricata** Bak. Stemless, 1 m. high: leaves up to 8 dm. long, 40 mm. wide above the broadly ovate sheath, densely punctulate-lepidote; blade narrowly triangular, subulate-acuminate: scape stout, erect, its bracts triangular-elliptic, long-caudate, imbricate: inflorescence laxly tripinnate, ample; primary bracts like the upper scape-bracts, much shorter than the axillary branches; branches of the inflorescence curved-ascending: spikes up to 20-flowered, 15 cm. long, 12 mm. wide; floral bracts narrowly ovate, inrolled at apex, 18–20 mm. long, glabrous, strongly nerved, exceeding the sepals: flowers erect or nearly so; sepals equally sub-free, narrowly elliptic, obtuse, 11–13 mm. long, glabrous, strongly nerved; petals blue or lilac, 25 mm. long; stamens included, equaling the style.—Bak. in Journ. Bot. xxv. 304 (1887); L. B. Smith in Contrib. Gray Herb. lxxxix. 15, t. iv, fig. 1 (1930). *T. orthorhachis* Mez & C. F. Bak. in Bull. Torr. Bot. Club, xxx. 435 (1903).

TRINIDAD: Marabella, 1868, *Herb. Trin. 2007* (Trin); woods near Wellington Estate, 1867, *Herb. Trin. 773* (Trin); Moruga, 1916, *Broadway 7600* (Trin, NY); Caroni Reclamation Lands, 1923, *Broadway 10231* (Trin, NY); St. Ann's, 1931, *Broadway* (G); indefinite, *Herb. Trin. 2005* (Trin, US, phot. G); *Fendler 816* (K, TYPE; BM).

[Jamaica, Cuba, Nicaragua, Panama, Colombia.]

Epiphytic.

11. **T. rubra** R. & P. Stemless, often 2 m. high: leaves densely rosulate; sheaths subovate, inconspicuous; blade linear, up to 8 cm. broad, triangular-acute: scape stout, erect, its bracts leaf-like, imbricate: inflorescence amply paniculate; primary bracts like the upper scape-bracts, much shorter than the axillary spikes: spikes lanceolate, acute, complanate, densely 6–28-flowered, 18–30 cm. long, 4–5 cm. wide, spreading or recurved, more or less stipitate with sterile bracts at base; floral bracts narrowly obovate, keeled at apex, glabrous, even, about equalling the sepals: flowers erect, short-stipitate, sepals equally sub-free, 35–45 mm. long, oblong-lanceolate, carinate; petals

5–6 cm. long, slightly exceeding the stamens.—Fl. Peruv. iii. 40, t. 266 (1802). *Tillandsia paniculata* Ch. & Schdl. in Linnaea, vi. 54 (1831), not L. (1762).

TRINIDAD: Morne Bleu, 1922, *Freeman 10570* (Trin); Maracas road to the waterfall, 1924, *Broadway 5363* (FM, Mo, K); Maracas, on the face of the waterfall, 1924, *Broadway 5366 in part* (Mo); Blanchisseuse road, St. Patrick Estate, 1930, *Broadway 7462* (G, S); Ortinola Estate, Maracas, 1931, *Broadway 7459* (G).

[Mexico and the Antilles to Venezuela, Peru and Bolivia.]

Epiphytic.

12. **T. didistichoides** Mez. Stemless, about 2 dm. high: leaves densely bulbose-rosulate, densely appressed-lepidote; sheaths broadly ovate, conspicuous, deep castaneous; blades narrowly triangular, involute-subulate: scape slender, decurved, its bracts broadly ovate, imbricate, inflated, caudate: inflorescence bipinnate; primary bracts like the upper scape-bracts, much shorter than the spikes, erect, concealing the main axis of the inflorescence: spikes rather densely 8–10-flowered, linear-lanceolate in outline, strongly compressed, 4–5 cm. long, 10–15 mm. wide, long-stipitate with several sterile bracts at base; floral bracts elliptic, acute, 15 mm. long, much exceeding the sepals, carinate, strongly nerved, obscurely lepidote, bright pink: flowers erect, 20 mm. long; sepals free, 10 mm. long, elliptic, acute, glabrous, strongly nerved; petals lilac; stamens slightly shorter than the petals.—Mez in DC. Mon. Phan. ix. 778 (1896). Pl. II, figs. 1–3.

TRINIDAD: indefinite, *Fendler 827* (BM, TYPE; K, phot. G); Saut d'Eau, north coast, 1930, *Broadway 7433* (G); Las Lapas road off the Blanchisseuse road, 1931, *Broadway 7457* (G, sterile specimen); Mt. Tucuche, near 12-mile post, 1931, *Broadway 7458* (G).

[Venezuela.]

Epiphytic.

13. **T. complanata** Benth. Stemless: leaves rosulate, minutely appressed-lepidote, often exceeding the inflorescences, 3–4 dm. long, 4–5 cm. broad above the broadly ovate sheath, often purple-tinged, ligulate, apex broadly acute to rounded-apiculate, scapes several to many from a single leaf-rosette, slender, each bearing a single spike; scape-bracts narrowly elliptic, acute or apiculate, mostly exceeding the internodes: spikes slender, 6–24-flowered, 4–8 cm. long, 15 mm. broad; floral bracts imbricate, elliptic, obtuse, ecarinate, 15 mm. long, even or finely striate-nerved, exceeding the sepals; flowers sessile, 22 mm. long; sepals much joined posteriorly, glabrous, nerved; petals blue or violet; stamens and style included: capsule cylindric, 4 cm. long.—Bot. Sulph. 173 (1845).

TRINIDAD: Heights of Aripo, 1922, *Broadway 10568* (Trin, K); Quare road via Valencia, near the reservoir, 1927, *Broadway 6780* (K); Las Lapas road off the Blanchisseuse road, 1931, *Broadway 7456* (G).
[Antilles, British Guiana, Venezuela, Colombia, Ecuador, Peru, Bolivia.]

Epiphytic.

14. **T. stricta** Soland. Stemless or short-stemmed, 2 dm. or less high: leaves densely rosulate, 14 cm. long, the outer ones strongly recurved, sheath small, membranaceous, blade narrowly triangular, 8 mm. broad, filiform-acuminate, densely appressed-lepidote: scape slender, glabrous, its bracts ovate, long-caudate, membranaceous, imbricate: inflorescence simple, polystichous, short-cylindric, 35 mm. wide; floral bracts broadly ovate, exceeding the sepals, glabrous or lepidote toward apex, inflated, nerved, roseate, the lower ones long-caudate: flowers suberect, 2 cm. long, sessile; sepals lance-oblong, compressed, keeled, nerved, equally short-connate; petals blue changing to red, exceeding the pistil; stamens shorter than the pistil: capsule cylindric, 38 mm. long.—Soland. in Bot. Mag. xxxvii. t. 1529 (1813).

TRINIDAD: Caroni Reclamation Lands, 1923, *Broadway 10232* (Trin, NY).
[Venezuela, British and Dutch Guiana, Brazil.]

Epiphytic.

15. **T. pulchella** Hook. Plant usually caulescent, often branching, rather variable: leaves densely polystichous-ranked, narrowly triangular, subulate-acuminate, channelled, densely and minutely appressed-lepidote, 4–7 mm. wide above the inconspicuous sheath: scape slender, short, largely concealed by the leaves, its bracts membranaceous, elliptic, caudate, rose: inflorescence of a single short 4–14-flowered polystichous spike; floral bracts like the scape-bracts but less caudate, much exceeding the sepals, punctulate-lepidote, strongly nerved: flowers erect; sepals almost completely connate posteriorly, lanceolate, acute, 10 mm. long; petals blue or white, 20 mm. long, broadly obtuse; stamens included, shorter than the style: capsule cylindric, 15 mm. long.—Hook. Exot. Fl. iii. t. 154 (1827).

TRINIDAD: indefinite, *De Schach* (Baker!).
[Antilles, Venezuela, Guiana, Brazil, Bolivia, Argentina.]

Epiphytic, often in large masses. Originally described from Trinidad.

16. **T. Gardneri** Lindl. Stemless: leaves densely rosulate, narrowly triangular, 20 cm. long, cinerous, densely tomentose-lepidote: inflorescence of a few short densely massed spikes: spikes ovate, acute, 4–6-flowered; floral bracts ovate, acute, 14 mm. long, exceeding the

sepals, carinate, densely lepidote: flowers erect, 15 mm. long, sessile; sepals ovate, acute, 10 mm. long, coriaceous, even; petals rose; stamens included, equaling or exceeding the style: capsule cylindric, 37 mm. long. —Lindl. in Bot. Reg. xxviii. sub t. 63 (1842).

TRINIDAD: Port of Spain, 1920, *N. L. Britton 1181* (G); Hort. Trin., 1895, *W. Lunt 5999* (Trin); Valley of Tumbasson, Caura, 1928, *F. C. Buthn 11978* (Trin); St. Ann's, 1916, *Broadway 8168* (Trin); small savannah near Government House kitchen garden, 1907, *Broadway* (Trin); indefinite, *Fendler 822* (Baker!), *Broadway 2631* (Mez!).
[Venezuela, Brazil.]

Epiphytic or saxicolous.

17. **T. monadelpha** (Morr.) Bak. Stemless, 35 cm. high: leaves densely rosulate, 2 dm. long, obscurely punctulate-lepidote; sheath ovate; blade very narrowly triangular, 10–15 mm. broad: scape erect, slender, glabrous, its bracts elliptic-lanceolate, lepidote at apex, imbricate: inflorescence simple, distichous, oblong-linear, about 22-flowered, appearing lax by the spreading of the flowers, 13 cm. long; rhachis straight, angled, thickened at base of each flower; floral bracts ovate-acute, spreading, 17 mm. long, equaling the sepals, keeled, nerved, sparsely lepidote, soon glabrous: flowers sessile, spreading, 30 mm. long; sepals equally short-connate, glabrous, keeled; petals white, blade ovate, reflexed; stamens deeply included, exceeding the style, filaments connate: capsule narrowly cylindric, 4–7 cm. long.—Bak. in Journ. Bot. xxv. 281 (1887). *Phytarrhiza monadelpha* Morr. in Belg. Hort. xxxii. 168, t. 7 (1882). *Tillandsia graminifolia* Bak. in Journ. Bot. xxv. 281 (1887). *T. monobotrya* Mez in Fedde Rep. Spec. Nov. xvi. 77 (1919).

TRINIDAD: Chaguanas, 1868, *Finlay 2004* (Trin, NY); 1889, *Broadway 3741* (Trin); Arima, 1906, *Dannouse* (Trin); Tamana forests, 1915, *Broadway 7808, 7818* (Trin); vicinity of Tabaquite, 1921, *N. L. Britton, Freeman & Nowell 2574* (NY); indefinite, *Fendler 828* (Baker!); *Broadway 2807* (Mez!).
[Guiana, Central America, Colombia, Ecuador.]

Epiphytic.

18. **T. anceps** Lodd. Stemless, 3 dm. high: leaves rosulate, 15–20 cm. long, minutely punctulate-lepidote; sheaths triangular-ovate, longitudinally red-striate; blades narrowly triangular, acuminate, 7 mm. broad: scape stout, erect, short and largely concealed by the leaves, its bracts broadly ovate, acute or acuminate, glabrous, even, densely imbricate, gradually passing into the floral bracts: inflorescence of a single stout compressed densely distichous spike, 10–20-flowered, up to 16 cm. long, 55 mm. wide; floral bracts triangular-acute,

up to 40 mm. long, much exceeding the sepals, strongly carinate, glabrous, even, pale rose with greenish margins: flowers erect, short-stipitate; sepals equally sub-free, 30 mm. long, lanceolate, acute, carinate toward apex; petals more than twice as long as the sepals, claw linear, white, blade lance-elliptic, acute, blue, spreading; stamens deeply included, exceeding the style.—Lodd. Bot. Cab. viii. t. 771 (1823). *T. lineatifolia* Mez in DC. Mon. ix. 686 (1896).

TRINIDAD: Tamana forests, 1915, *Broadway 7809* (Trin); Mt. Tamana, 1925, *Broadway* (FM).
[Honduras, Costa Rica, Panama, Venezuela, British Guiana.]

Epiphytic. Originally collected in Trinidad by Adam. Introduced in European cultivation by Loddiges.

19. **T. Morreniana** Regel. Habit almost identical with that of *T. anceps* and rather difficult to distinguish from it without good flowers: inflorescence rather more dense than in *T. anceps* and the floral bracts deep rose drying to a blackish brown: petals with suborbicular blade, blue, up to 60 mm. long.—Regel in Gartenfl. xix. 41 (1870). *T. Lindeni* Morr. in Belg. Hort. xix. 321, t. 18 (1869); not *T. Lindeniana* Regel in Gartenfl. xviii. 193 (1869).

TRINIDAD: Hort. Trin., *Herb. Trin. 4392* (Trin).
[Peru.]

Introduced in cultivation.

20. **T. usneoides** L. Long-filiform-caulescent, flexuous, often densely massed, gray to somewhat ferruginous, densely tomentose-lepidote throughout: leaves distichous; sheath elliptic; blade linear, less than 1 mm. broad, recurving: flowers solitary, soon becoming axillary by the elongation of the stem, short-pedicelled, yellowish green or blue, 10–12 mm. long; sepals narrowly ovate, equally connate at base, 7 mm. long; petals small, blade narrow, recurved; stamens deeply included, exceeding the style: capsule narrowly cylindric, abruptly short-beaked.—Sp. Pl. ed. 2. 411 (1762).

TRINIDAD: indefinite, *Herb. Trin. 822* (Trin); *Fendler 813* (Mez!).
TOBAGO: indefinite, *Broadway 2492* (Mez!).
[Southern United States to central Argentina and Chile.]

Epiphytic.

Species of Uncertain Position.

T. compressa Bert. So far all Trinidad specimens labelled as this species, on examination, have proved to be *T. fasciculata*.

4. **VRIESIA** Lindl.

Large showy herbs. Leaves densely rosulate, often banded or mottled, entire. Inflorescence various, spikes usually distichous-flowered. Floral bracts conspicuous, enfolding or concealing the bases of the flowers. Flowers with short stout pedicels, fugacious. Sepals free. Petals free, ligulate, scales usually two on the inside of each petal and entire. Ovary nearly or quite superior, style elongate. Ovules many, usually caudate. Seeds fusiform, with a long coma.—Lindl. in Bot. Reg. xxix. t. 10 (1843).

About 100 species. Epiphytic, rarely terrestrial. Chiefly Brazilian with outlying species from Mexico and the Antilles to Argentina.

Key to Species.[1]

1. Petals not flaccid, erect or nearly so.....Subgenus *Euvriesia*.
   2. Stamens exserted at anthesis.....§ *Genuinae*.
      3. Inflorescence compound: spikes dense.....1. *V. stenostachya*.
      3. Inflorescence simple.
         4. Inflorescence erect: floral bracts imbricate, much exceeding the sepals.....2. *V. longibracteata*.
         4. Inflorescence pendulous: floral bracts remote, spreading, shorter than the sepals.....3. *V. simplex*.
   2. Stamens included at anthesis.....§ *Xiphion*.
      5. Inflorescence simple or rarely forked.
         6. Inflorescence dense: flowers not secund.....4. *V. chrysostachys*.
         6. Inflorescence lax.
            7. Flowers and floral bracts not at all secund: inflorescence many-flowered.....5. *V. macrostachya*.
            7. Flowers and floral bracts secund: inflorescence few-flowered.....6. *V. Broadwayi*.
      5. Inflorescence definitely paniculate.
         8. Floral bracts erect or nearly so: spikes rather dense..7. *V. albiflora*.
         8. Floral bracts spreading: spikes lax.....8. *V. procera*.
1. Petals flaccid, pendant.....Subgenus *Alcantarea*.
   9. *V. paniculata*.

1. **V. stenostachya** (Bak.) Mez. Leaves 7 dm. long, 6–8 cm. wide, linear: inflorescence compound; spikes 5 dm. long, bearing many sterile bracts at base; floral bracts 55 mm. long, rose: flowers with pedicels 2–4 mm. long; sepals narrowly elliptic, obtuse, 26 mm. long; petals yellow (?).—Mez in DC. Mon. Phan. ix. 564 (1896). *Tillandsia stenostachya* Bak. in Journ. Bot. xxvi. 109 (1888).

TRINIDAD: by Maracas Falls, 1845, *Crueger* (K, TYPE); 1925, *Broadway 5560* (FM, phot. G, Mo); wet cliff at waterfall, Mt. Tucuche, 1920, *Britton, Hazen & Mendelson 1317* (NY, phot. G); *Freeman 9068* (Trin); 1924, *Broadway 5366 in part* (NY).

[Endemic.]

[1] For key to use in identifying imperfect material see p. 159.

2. **V. longibracteata** (Bak.) Mez. Stemless, 1 m. high or less: leaves 4 cm. or more broad, linear, abruptly acute, concolorous in all Trinidad material: scape erect, its bracts broadly ovate, acute or apiculate, densely imbricate: inflorescence simple, narrowly lanceolate, densely many-flowered; floral bracts up to 7 cm. long, lanceolate, acute, red at anthesis, later turning green, more or less incurved: flowers yellow, rarely known to emerge from the bracts in the Trinidad specimens (Broadway!), pedicels 7 mm. long; sepals narrowly elliptic, 25 mm. long.—Mez in DC. Mon. Phan. ix. 568 (1896), as *longebracteata*. *Tillandsia longibracteata* Bak. in Journ. Bot. xxvi. 81 (1888).

TRINIDAD: near summit of Mt. Tucuche, 1920, *N. L. Britton, Hazen & Mendelson 1363* (US, NY); Heights of Aripo, 1922, *Broadway 9913* (Trin, G, NY); *9918* (Trin, NY); Blanchisseuse road, 1925, *Broadway 5669* (FM, Mo); 1928, *Broadway* (K); Mora forest, 1927, *Broadway* (Mo); Morne Bleu, 1922, *Freeman 10569* (Trin); Valencia road, 1931, *Broadway 7584* (G); indefinite, *Fendler 830, 831* (Baker!); *Crueger* (Mez!); *Herb. Trin. 2008 in part* (Trin). TOBAGO: Mason Hall, 1913, *Broadway* (US).
[Venezuela, British Guiana.]

Epiphytic and terrestrial.

3. **V. simplex** (Vell.) Beer. Leaves rosulate, up to 5 dm. long; sheaths broadly elliptic, often with a strong purple tinge, minutely punctulate-lepidote; blades ligulate, up to 35 mm. broad, rounded-apiculate or abruptly acute: scape slender, strongly decurved, its bracts elliptic, varying from distinctly shorter than the internodes to slightly imbricate: inflorescence simple, pendulous, very lax, much exceeding the leaves if extended; rhachis slender, flexuous; floral bracts broadly ovate, 3–5 cm. long, red with yellow apex, much exceeded by the sepals: flowers remote, spreading, 4–8 cm. long, long-pedicelled; sepals oblong, yellow, 30–35 mm. long; petals yellow with green tips; stamens exserted.—Beer, Brom. 97 (1857). *Tillandsia simplex* Vell. Fl. Flum. 133 (1825), Icones, iii. t. 130 (1827). *Vriesia scalaris* Morr. in Belg. Hort. xxix. 301 (1879).

TRINIDAD: Tamana, *Herb. Trin. 1749* (Trin).
[Brazil, Venezuela, Colombia.]

Epiphytic.

4. **V. chrysostachys** Morr. Stemless, about 5 dm. high: leaves rosulate, ligulate, acuminate, concolorous, 40–48 mm. wide: scape erect, its bracts densely imbricate: inflorescence simple or of 2–3 erect spikes; spikes very narrow, 30 cm. long, 2 cm. broad; floral bracts 35 mm. long, distichous, yellow, coriaceous, exceeding the flowers, densely imbricate, slightly if at all incurved: flowers yellow,

25 mm. long, subsessile; sepals ovate-lanceolate, acute, 15 mm. long, apex cucullate-incurved; petals 24 mm. long, their scales entire, acute. —Morr. in Belg. Hort. xxxi. 87 (1881). *Tillandsia chrysostachys* Bak. in Bot. Mag. cxii. t. 6906 (1886). *Tillandsia trinitensis* Bak. Brom. 211 (1889).

TRINIDAD: *Fendler 820* (Mez!).
[Peru.]

5. **V. macrostachya** (Bello) Mez. One meter or more high: leaves 1 m. long; sheath large, dark brown; blade ligulate, 8 cm. broad, rounded-apiculate, concolorous: scape very stout, erect, its bracts ovate-elliptic, acute, densely imbricate: inflorescence simple, 5–7 dm. long, many-flowered; rhachis over 1 cm. thick at base; floral bracts broadly ovate, 6 cm. long, about equaling the sepals, ecarinate, coriaceous: flowers spreading with stout pedicels 13 mm. long; sepals ovate, obtuse, 42 mm. long, 17 mm. wide: coma whitish.—Mez in DC. Mon. Phan. ix. 601 (1896). *Caraguata macrostachya* Bello in Anal. Soc. Esp. Hist. Nat. xii. 122 (1883).

TRINIDAD: Las Lapas, off the Blanchisseuse road, 1927, *Broadway 7361* (G).
[Cuba, Porto Rico, Venezuela.]

Epiphytic.

6. **V. Broadwayi** L. B. Smith (see p. 149). Five dm. high: leaves 3 dm. long; sheath elliptic, densely and minutely ferruginous-lepidote throughout; blade narrowly lanceolate, acuminate, 2 cm. wide, glabrous above, scantly lepidote below: scape erect, slender; scape-bracts densely imbricate, sparsely lepidote, the lower foliaceous, the upper broadly elliptic, apiculate, pale brown: inflorescence simple, racemose, strongly secund, 7–9 cm. long, laxly 5–7-flowered, minutely ferruginous-lepidote; rhachis flexuous; floral bracts broadly ovate, abruptly acute, brown, up to 22 mm. long, distinctly shorter than the sepals, secund with the flowers: flowers with stout pedicels; sepals broadly elliptic, obtuse, 18 mm. long, subcoriaceous, faintly nerved, dark brown except for the pale margin; petals not known: capsule subcylindric, 35 mm. long. Pl. I, figs. 9–10.

TRINIDAD: Heights of Aripo, 1922, *Broadway 9916* (Trin, TYPE; phot. G; K; NY); Mt. Tucuche, 1920, *N. L. Britton, Hazen & Mendelson 1258 in part* (G); 1929, *Broadway 7096* (K).
[Endemic.]

Epiphytic.

7. **V. albiflora** Ule. Over 1 m. high: leaves 6 dm. long, blade ligulate, 7 cm. wide, flat, rounded-apiculate, subglabrous: scape erect,

stout, its bracts elliptic, acute, imbricate: inflorescence laxly bipinnate; primary bracts lanceolate, much shorter than the spikes: spikes suberect, linear, 25 cm. long, 2–3 cm. broad, compressed, prophyllate; floral bracts lanceolate, 25 mm. long, equaling the sepals, keeled, glabrous, even, imbricate: flowers erect; sepals narrowly elliptic, acute, coriaceous; petals ligulate, bearing 2 scales 10 mm. from the base, white; stamens and style included: capsule short, equaling the sepals.—Ule in Verhandl. Bot. Ver. Brandenb. xlviii. 141 (1907). *Tillandsia rhodactyla* Mez, Fedde Rep. Spec. Nov. xvi. 76 (1919).

TRINIDAD: near Tamana, 1868, *Herb. Trin. 2008 in part* (Trin); Tamana forest, 1915, *Broadway 7806* (Trin, NY).
[Guiana, Brazil, Peru.]

Epiphytic.

8. **V. procera** (Mart.) Wittm. Fully 1 m. or more high: leaves 4 dm. long, sublinear, 6 cm. wide above the large ovate sheath, rounded-apiculate, glabrate, green: scape-bracts leaf-like, mostly exceeding the internodes: inflorescence laxly paniculate, its branches flexuous, slender; floral bracts 28 mm. long, shorter than the sepals, elliptic, acute, ecarinate, enfolding the base of the flower: flowers spreading, remote, 35 mm. long; sepals oblong, rounded; petals yellow, scales lanceolate: coma brownish.—Wittm. in Engl. Bot. Jahrb. xiii. Beibl. 29, 21 (1891), as *Vriesea*. *Tillandsia procera* Mart. in R. & S. Syst. vii. 1224 (1830). *Vriesia gracilis* Gaud. Voy. Bonite Atl. t. 67 (1846). *Tillandsia viscidula* Britton, Bull. Torr. Bot. Club, xlviii. 328 (1922).

TRINIDAD: forest, four miles east of Arima, 1920, *N. L. Britton, Hazen & Mendelson 596* (Trin); Moruga, 1921, *N. L. Britton & Broadway 2430* (NY, TYPE of *Tillandsia viscidula;* Trin); Usine St. Madeleine, San Fernando, 1925, *Broadway 5623* (FM, K); Maracas road to the Bay, on the ridge, 1926, *Broadway 6135* (S, K); near no. 6 bridge, Cumuto road, Cumuto, 1931, *Broadway 7717* (G); indefinite, *Broadway* (Mo); *2774* (Mez!).
[British and Dutch Guiana, Brazil.]

Epiphytic.

9. **V. paniculata** (L.) Mez. Stemless, 1 m. high or less: leaves rosulate, linear-lanceolate, acute or acuminate, up to 60 cm. long, 4–6 cm. wide: scape erect, its bracts leaf-like, densely imbricate: inflorescence usually compound and few-branched; spikes laxly few-flowered, erect; floral bracts ovate-acuminate, exceeding the sepals, ecarinate, straight, partially enfolding the flowers, not at all imbricate, submembranaceous: flowers 6–9 cm. long, with stout pedicels 6 mm. long; sepals 35 mm. long, elliptic, acuminate, subpungent; petals long, flaccid, pendent, white.—Mez in DC. Mon. Phan. ix. 614 (1896), as *Vriesea paniculata*. *Renealmia paniculata* L. Sp. Pl. 286 (1753).

TRINIDAD: indefinite, *Broadway 3235* (Mez!).
[Antilles, Panama, Colombia.]

5. **GUZMANIA** R. & P.

Leaves densely rosulate, entire, sheaths conspicuous. Inflorescence various, spikes always polystichous. Flowers perfect. Sepals usually somewhat connate. Petals connate or closely conglutinated, naked, yellow or white. Stamens usually included, filaments more or less fused to the petals. Ovary wholly superior, pyramidal, ellipsoid or ovoid, glabrous. Ovules many, densely glomerate. Capsule septicidal. Seeds with a long straight usually brownish coma.—Fl. Peruv. iii. 37, t. 261 (1802).

About 80 species. Chiefly Andean with outlying species in Central America, the Antilles, Venezuela, Guiana and the Amazon Basin.

Key to Species.

1. Inflorescence simple.
   2. Inflorescence short, corymbiform ..... 1. *G. lingulata.*
   2. Inflorescence cylindric, bracts membranous ..... 2. *G. monostachia.*
1. Inflorescence compound ..... 3. *G. megastachya*

1. **G. lingulata** (L.) Mez. Stemless, 3 dm. high: leaves 3–4 dm. long, obscurely punctulate-lepidote, blade lingulate, acute, 3–4 cm. wide: scape stout, erect, often short, its bracts leaf-like, densely imbricate: inflorescence short, corymbiform, 7 cm. broad; outer bracts lanceolate, forming an involucre which wholly conceals the flowers, red-tinged; floral bracts shorter than the flowers, linear, cucullate: flowers erect, short-pedicelled, 45 mm. long, sepals free, 17 mm. long, narrowly linear, rounded, glabrous; petals linear, cucullate, white; ovary ellipsoid: capsule subellipsoid, 3 cm. long, short-beaked; coma reddish brown.—Mez in DC. Mon. Phan. ix. 899 (1896). *Tillandsia lingulata* L. Sp. Pl. 286 (1753). *Caraguata lingulata* Lindl. in Bot. Reg. xiii. sub. t. 1068 (1827).

TRINIDAD: vicinity of Valencia, 1921, *Britton, N. L. & E. G. 2089* (G, NY); Quare River, 1922, *Williams 10681* (Trin); Long stretch, via Valencia, 22–23 mile posts, 1928, *Broadway* (Mo); indefinite, *Fendler 836* (Mez!).
TOBAGO: indefinite, 1918, *Williams* (Trin); *Eggers 5799, 5861b* (Mez!).
[Central America, Antilles, Colombia, Venezuela, Guiana, Brazil.]

Epiphytic.

2. **G. monostachia** (L.) Rusby. Stemless, 2–4 dm. high: leaves rosulate, obscurely punctulate-lepidote, soon glabrous; sheaths broadly ovate, brownish; blades linear, 20 mm. wide, acute, yellowish green: scape erect, its bracts ovate, acute, imbricate, pale green: inflorescence of a single elongate polystichous spike, cylindric, 8–15 cm.

long, sterile toward apex; floral bracts imbricate, ovate, acute, membranous, the fertile ones pale green with conspicuous brown longitudinal stripes, about equaling the flowers, the sterile ones bright red: flowers erect, white, 23–29 mm. long; sepals joined equally for about 1/4 their length, 18 mm. long, obovate, broadly rounded, even, coriaceous; petals fused for most of their length, lobes elliptic, broadly rounded; stamens included, filaments connate with the petals for most of their length: capsule cylindric, 2–3 cm. long.—Rusby ex Mez in DC. Mon. Phan. ix. 905 (1896), as *G. monostachya*. *Tillandsia monostachia* L. Sp. Pl. ed. 2. 410 (1762). *Guzmania tricolor* R. & P. Fl. Peruv. iii. 38, t. 261 (1802).

TRINIDAD: San Fernando, 1868, *Herb. Trin. 827* (Trin); Hort. Trin., 1890, *Broadway 4090* (Trin); Arima, 1904, *Dannouse* (Trin); Maracas road to the waterfalls, 1927, *Broadway 6598* (K); St. Augustine, 1929, *Beattie 12275* (Trin); St. Ann's, 1931, *Broadway* (G); Valencia road, near the Oropuche River, 1931, *Broadway 7585* (G); indefinite, *Crueger 3604* (Trin); *Fendler 821, 829; Ryan; Broadway 2676, 2729, 3233* (Mez!). TOBAGO: Mason Hall, riverside, 1913, *Broadway* (Trin, G, NY); *4688* (G); indefinite, *Eggers 5708, 5936; Meyer* (Mez!).

[Antilles, Venezuela, Colombia, Ecuador, Peru.]

Epiphytic.

3. **G. megastachya** (Bak.) Mez. Stemless, 7 dm. or more high: leaves 5 dm. long, obscurely punctulate-lepidote, linear, 4 cm. wide, acute: scape erect, stout, its bracts elliptic-lanceolate, acute, densely imbricate: inflorescence many-flowered, elongate, subcylindric, about 2 dm. long; branches much abbreviated; primary bracts broadly ovate, acute, 55–80 mm. long, exceeding the axillary spikes: spikes subsessile, polystichous-flowered; floral bracts subtriangular, 40 mm. long, equaling or exceeding the sepals, strongly carinate, submembranaceous: flowers 62 mm. long, subsessile; sepals free, linear, acute, strongly nerved; petals conglutinated into a narrow tube for most of their length, lobes narrowly elliptic, rounded; stamens included: capsule 37 mm. long, subclavate.—Mez in DC. Mon. Phan. ix. 928 (1896). *Tillandsia foliosa* Griseb. Fl. W. Ind. 597 (1864), not Mart. & Gal. (1843). *T. megastachya* Bak. in Journ. Bot. xxvi. 46 (1888). *T. magna* Bak. Brom. 210 (1889).

TOBAGO: indefinite, *Eggers 6936* (Mez!).
[Lesser Antilles.]

6. **CATOPSIS** Griseb.

Stemless herbs. Leaves densely utriculate-rosulate, entire, minutely appressed-lepidote, green, sheath large, ovate. Scape conspicuous.

Inflorescence usually bipinnate, rarely simple or tripinnate, exceeding the leaves, its branches polystichous-flowering. Flowers small or minute, sessile, perfect in the Trinidad species. Sepals free, usually obtuse, strongly asymmetric, glabrous. Petals free, naked. Stamens included, anthers ovate or elliptic. Ovary superior, broadly ovoid or ellipsoid in the perfect or fertile flowers, style shorter than the ovary or absent. Ovules few–many, long-caudate. Capsule septicidal. Seeds with coma folded over, their bases projecting from the capsule.—Griseb. in Goett. Nachr. 1864. 21 (1865).

About twenty species. Chiefly in Central America and the Antilles, with outlying species in Florida, northern South America, the Andes, and southern Brazil.

Key to Species.

1. Leaves acute or acuminate: inflorescence definitely paniculate.
   2. Scape-bracts and primary bracts ovate-acute: sepals 12 mm. long ..... 1. *C. Berteroniana.*
   2. Scape-bracts and primary bracts narrowly lanceolate, acuminate: sepals 6 mm. long ..... 2. *C. nutans.*
1. Leaves rounded-mucronate: inflorescence simple or of only a few spikes ..... 3. *C. sessiliflora.*

1. **C. Berteroniana** (Schult. f.) Mez. About 8 dm. high: leaves 3 dm. long, blade 5 cm. broad, subtriangular, acuminate: scape erect, its bracts lance-ovate below, broadly ovate above, equaling or exceeding the internodes: inflorescence laxly bipinnate, 30 cm. long, 12 cm. wide; spikes long-stipitate, 6–30-flowered; primary bracts ovate-apiculate, much shorter than the sterile base of the spikes; floral bracts suborbicular, 8 mm. long: flowers perfect, suberect; sepals 13 mm. long, exceeding the petals, strongly asymmetric, even, yellowish; petals white, ovate-elliptic; style 1/3 as long as the ovary, ovary broadly ellipsoid: coma pale brown.—Mez in DC. Mon. Phan. ix. 621 (1896). *Tillandsia Berteroniana* Schult. f. in R. & S. Syst. vii. 1221 (1830). *Catopsis Mosenii* Mez in DC. Mon. Phan. ix. 622 (1896).

TRINIDAD: Aripo Savanna, 1920, *N. L. Britton, Broadway & Hazen 271* (NY); indefinite, *Fendler 819*, *Broadway 2773*, *3238* (Mez!).

[Florida, British Honduras, the Antilles, British Guiana, Brazil.]

2. **C. nutans** (Sw.) Griseb. Stemless, 5 dm. high or less: leaves rosulate; sheaths broadly ovate; blades subtriangular, acuminate: scape slender, erect; scape-bracts narrowly lanceolate, acuminate: inflorescence laxly bi- or tripinnate; primary bracts like the scape-bracts, much shorter than the axillary spikes: spikes suberect, laxly flowered, long-stipitate; floral bracts broadly ovate, much shorter

than the sepals: flowers perfect, suberect; sepals broadly elliptic, 5–6 mm. long, strongly asymmetric, glabrous, nerved; petals elliptic, obtuse, white, slightly exceeding the sepals; ovary broadly ovoid.—Griseb. Fl. W. Ind. 599 (1864), not as used by Bak. *Tillandsia nutans* Sw. Prodr. 56 (1788).

TRINIDAD: woods of Morne L'Enfer, La Brea, *Crueger 2003* (Trin); Arima, 1901, *Dannouse* (Trin); Caparo, 1908, *Broadway 2675* (FM); Tabaquite, near El Paraiso, 1917, *Broadway 8949* (Trin); near Tabaquite, 1918, *Broadway* (Trin, G, NY); 1919, *Broadway* (NY); Maracas road to waterfall, 1924, *Broadway 5364* (FM, Mo); woods of Cumuto, 1–2 miles from railway south, 1925, *Broadway* (FM); indefinite, *Broadway 2806*, *Fendler 817* (Mez!).

[Antilles, Florida, Central America.]

Epiphytic.

3. **C. sessiliflora** (R. & P.) Mez. From 2 to 4 dm. high: leaves tubular-rosulate, 15 cm. long, blade sublinear, 22 mm. wide, rounded-apiculate: scape erect, its bracts remote: inflorescence simple or of only a few spikes, rhachis straight; floral bracts shorter than the sepals: flowers perfect, suberect, 10 mm. long; sepals suborbicular, 7.5 mm. long; petals ovate-lanceolate, slightly exceeding the sepals, white; style short but distinct; ovary large, ovoid.—Mez in DC. Mon. Phan. ix. 625 (1896). *Tillandsia sessiliflora* R. & P. Fl. Peruv. iii. 42, t. 271, fig. b (1802). *T. nitida* Hook. Exot. Fl. iii. t. 218 (1827). *Catopsis nitida* Griseb. Fl. W. Ind. 599 (1864). *C. nutans* as used by Bak. in Journ. Bot. xxv. 176 (1887), not Griseb.

TRINIDAD: Moruga, 1921, *N. L. Britton & Broadway 2443* (NY); Heights of Aripo, 1922, *Broadway 9914* (Trin, NY). TOBAGO: indefinite, *Eggers 5709*, *Broadway 4013*, *4354*, *4444*, *4831* (Mez!).

[Mexico and the Antilles to Peru and eastern Brazil.]

Epiphytic.

7. **BROMELIA** [Plum.] L.

Coarse herbs, spreading by subterranean stolons. Leaves usually rosulate, with large curved spines along the margin. Inflorescence sessile or stipitate, always paniculate, densely tomentose-lepidote in most species. Sepals free or somewhat united, obtuse or acute, rarely mucronulate. Petals dorsally united by the filaments, but their margins free, eligulate, fleshy in most species. Stamens included, often much conjoined by their filaments. Anthers narrow, acute. Ovary passing gradually into the thick pedicel, epigynous tube conspicuous to nearly lacking. Berry succulent, relatively large. Seeds few to many, flattened, naked.—Sp. Pl. 285 (1753).

Thirty-four species. Mexico and the Antilles to Argentina.

Key to Species.

1. Inflorescence a densely capitate panicle, sessile, sunk in the leaf-rosette.....Subgenus *Karatas.*
   2. Floral bracts shorter than the sepals: scales on the inflorescence ferruginous, coarsely lacerate.....1. *B. Karatas.*
   2. Floral bracts longer than the sepals: scales on the inflorescence white, divided so finely as to appear hair-like.....2. *B. humilis.*
1. Inflorescence an elongate rather open panicle, definitely stipitate. Subgenus *Eubromelia.*
   3. *B. chrysantha.*

1. **B. Karatas** L. Pinguin. Leaves densely rosulate, very narrowly triangular: inflorescence densely capitate, subconical, deeply immersed in the center of the leaf-rosette, densely ferruginous-tomentose throughout: floral bracts distinctly shorter than the sepals, linear-oblong, acute, spinulose-serrate: flowers 55 mm. long, passing indistinguishably into a short thick pedicel; sepals coriaceous, free, acute, entire, 22–25 mm. long; petals narrowly lanceolate, fleshy, glabrous, 30 mm. long, definitely exceeding the sepals, united for more than half their length; ovary few-seeded; style thick, trigonous: berry 80 mm. long, 20 mm. thick, greenish yellow, edible.—Sp. Pl. 285 (1753).

TRINIDAD: St. Ann's, 1923, *Broadway 5113*, 1922, *Broadway 5336* (FM).
[Mexico and the Antilles to Colombia and British Guiana.]

In hard lands under trees. Fruits edible.

2. **B. humilis** Jacq. Plants relatively small, less than 1 m. in diameter, propagating by leafy stolons: leaves densely rosulate, the outer recurving, the inner suberect and usually tinged with red or purple; sheath triangular-ovate, pale-tomentose-lepidote or glabrous; blade narrowly triangular, spinose-serrate: inflorescence densely capitate, sessile, sunk in the center of the leaf-rosette, densely pale-tomentose-lepidote: floral bracts lanceolate to linear, equaling the sepals: flowers 5–7 cm. long; sepals free, erect, entire, narrow, 20 mm. long; petals fleshy, purple at apex becoming white below, 40 mm. long, linear, obtuse, glabrous, connate for 1/3 their length; ovary cylindric.—Enum. Vindob. App. 306 (1762).

TRINIDAD: Chacachacare, 1890, *Hart 3751* (Trin, NY).
[Antilles, Venezuela.]

Terrestrial.

3. **B. chrysantha** Jacq. Terrestrial, 1–1.5 m. high: leaves densely rosulate, narrowly triangular: inflorescence scapose, paniculate, cylindric, ferruginous-tomentose; floral bracts broadly ovate, apiculate: flowers 45 mm. long, obscurely pedicellate; sepals broadly ovate,

mucronate, 10–12 mm. long; petals bright yellow, blade broad and conspicuous.—Hort. Schoenbr. i. 28, t. 55 (1797). *B. aurea* Britton, Bull. Torr. Bot. Club, xlviii. 328 (1922).

TRINIDAD: coastal hillside, western end of Monos Island, 1921, *Britton, N. L. & E. G., & Brown, M. S. 2736* (G, NY, TYPE of *B. aurea*).
[Venezuela, Colombia.]

8. **ARAEOCOCCUS** Brongn.

Low herbs. Leaves appressed-lepidote. Inflorescence laxly paniculate, scapose. Flowers small, inconspicuous. Sepals connate for half their length, rounded, glabrous. Petals free, reflexed at anthesis, eligulate. Stamens shorter than the petals, filaments free, anthers longer than the filaments, pollen grains ellipsoid with a pore at either end. Ovary terete, glabrous, no epigynous tube, style longer than the petals, stigma-lobes scarcely twisted. Ovules few (up to 10), borne at the top of the placenta, long-caudate. Seeds narrowly ovoid-cylindric, acute at either end.—Ann. Sci. Nat. ser. 2, xv. 370 (1841).

Four species. Trinidad, Tobago, Guiana, Brazil, Costa Rica.

1. **A. micranthus** Brongn. Leaves few, fasciculate, subpetiolate, spinulose-serrate, blades recurving, acute, 30–40 cm. long, 1–2 cm. wide: scape very slender, terete, erect; scape-bracts narrowly lanceolate, membranaceous, entire: inflorescence laxly subpyramidal, 15 cm. long, glabrous, its axes strongly geniculate, reddish: spikes laxly 3–8-flowered; floral bracts ovate, apiculate, 2–2.5 mm. long, spreading: flowers 5 mm. long, sessile; sepals 0.5–0.75 mm. long, suborbicular; petals 3–3.5 mm. long, with a short broad claw, abruptly acute; ovary subglobose, 2 mm. thick; ovules usually 2 in each cell: berry purple.—Ann. Sci. Nat. ser. 2, xv. 370 (1841).

TRINIDAD: Aripo Road via Arima, 4–5 mile posts, 1925, *Broadway 5708* (FM, S); 3–4 mile posts, 1927, *Broadway* (Mo); indefinite, *Prestoe 1672* (Trin). TOBAGO: the Widow, 1913, *Broadway* (G, NY); indefinite, *Hart 4143* (Trin).
[Guiana, the Amazon Basin.]

Epiphytic.

9. **HOHENBERGIA** Schult. f.

Mostly large showy herbs. Leaves densely rosulate, usually spinulose-serrate. Inflorescence scapose, compound. Spikes densely strobiliform, sessile or stipitate. Flowers sessile, compressed, mostly hidden by the floral bracts. Sepals strongly asymmetric, usually free. Petals nearly or quite free, naked. Pollen with 2 or 4 pores. Epigynous tube small or none. Ovules several to many in each cell.

Fruit dry, scarcely enlarged from the ovary.—Schult. f. in R. & S. Syst. vii. p. lxxi, 1251 (1830).

Twenty-seven species. Terrestrial and epiphytic. The Antilles, Venezuela, Guiana and Brazil.

1. **H. oligosphaera** (Bak.) Mez. Leaves about 1 m. long, 75 mm. wide, abruptly acute or rounded-apiculate, spines 1–3 mm. long, independent sclerenchyma bundles present: inflorescence tripinnate; primary bracts reflexed, broadly triangular, much exceeding the lower branches; spikes subglobose, stipitate; floral bracts with suborbicular base, contracted into a long-acuminate apex, 25–30 mm. long, purple: sepals acute, glabrous, carinate, 15–18 mm. long, the posterior ones distinctly longer than the anterior; petals acute, violet-purple; anthers acute; ovary glabrous.—Mez in DC. Mon. Phan. ix. 124 (1896). *Aechmea oligosphaera* Bak. Brom. 48 (1889). Pl. I, fig. 8.

TRINIDAD: Hort. Trin., 1890, *Broadway 3961* (Trin); Moruga, Edward Trace, 1916, *Broadway 8203* (Trin); forest, vicinity of Tabaquite, 1921, *N. L. Britton, Freeman & Nowell 2581* (NY, Trin, G). TOBAGO: Mason Hall, near the river, 1913, *Broadway 4517* (FM); 1914, *Broadway 4834* (US).

[Venezuela.]

Epiphytic.

10. **WITTMACKIA** Mez.

Large showy herbs. Leaves rosulate, abruptly acute or rounded, closely serrate. Scape central, often decurved, its bracts membranaceous. Inflorescence laxly bipinnate, composed of several elongate laxly polystichous spikes. Floral bracts minute, narrowly acuminate. Sepals nearly or quite free, mucronate, the right side extended into a broad membranaceous wing. Petals free, narrowly acute, recurved at anthesis, eligulate. Ovary glabrous, sessile, epigynous tube short. Style longer than the stamens. Ovules crowded, obtuse. Fruit dry, scarcely changed from the ovary. Seeds many, curved, obtuse, naked. —Mez in Mart. Fl. Bras. iii. pt. 3, 274 (1891).

Three species. The Antilles and Costa Rica to Guiana and Brazil.

1. **W. lingulata** (L.) Mez. Leaves about 1 m. long, 5–10 cm. wide, rounded-apiculate, finely spinulose-serrate: scape slender, at first light-floccose, later glabrous; scape-bracts membranaceous, lanceolate, entire or sparingly fine-dentate: inflorescence ample, its branches suberect to spreading and often arching; primary bracts spreading; floral bracts narrowed from a broadly ovate base into a bristle-like point, about equaling the ovary: flowers 12–18 mm. long, sessile; sepals glabrous, 3 mm. long without the terminal spine; petals 7–10

mm. long, acute; stamens shorter than the petals, anthers mucronate; ovary ellipsoid-cylindric to clavate, 7 mm. long.—Mez in Mart. Fl. Bras. iii. pt. 3, 275 (1891). *Bromelia lingulata* L., Sp. Pl. 285 (1753). *Billbergia odora* Miq. in Linnaea, xviii. 377 (1844). *Chevalliera lingulata* Griseb. Fl. Br. W. Ind. 591 (1864). *Acchmea lingulata* Bak. in Journ. Bot. xvii. 164 (1879). *Wittmackia odora* Mez in Mart. Fl. Bras. iii. pt. 3, 277 (1891).

TRINIDAD: Marabella, 1865, *Crueger 2000* (Trin); Santa Cruz Valley, 1874, *O. Kuntze 662* (NY); Moruga, Edward Trace, 1916, *Broadway 8204* (Trin); base of Mt. Tamana, 1920, *Britton, N. L. & E. G., & Hazen 1962* (NY, G); *Freeman 9070* (Trin); indefinite, *Fendler 833; Prestoe; Broadway 3236* (Mez!). TOBAGO: Mason Hall, near the river, 1914, *Broadway 4829* (NY, Bk); indefinite, *Eggers 5741; Meyer* (Mez!).
[Lesser Antilles, Costa Rica, Guiana, northern Brazil.]

Epiphytic.

11. **GRAVISIA** Mez.

Stemless plants with densely rosulate, linear, spinulose leaves. Scape central, large, its bracts entire. Inflorescence twice or thrice pinnate, many-flowered. Sepals free, erect, asymmetric, short-mucronate. Petals free, erect, bearing two coarsely crenate or deeply incised scales near the base. Stamens included, the first series alternate with the petals and free, the second more or less fused to the petals. Pollen grains with more than 5 pores. Ovary sessile, epigynous tube conspicuous. Ovules many, caudate, borne on the upper half of the placenta.—Mez in Mart. Fl. Bras. iii. pt. 3, 299 (1892).

Eight species. Antilles, Costa Rica, and northern South America.

Key to Species.

Inflorescence dense, subglobose: primary bracts broad, suborbicular.
1. *G. aripensis.*

Inflorescence elongate with its lower branches remote: primary bracts lanceolate. . . . . 2. *G. aquilega.*

1. **G. aripensis** N. E. Brown. Leaves 6–10 dm. long; blade abruptly acute, mucronate, 5 cm. wide, teeth 1 mm. long: scape erect, 7–10 mm. thick, densely brown-lanate; scape-bracts slightly imbricate, broadly ovate, bright pink, soon glabrous: inflorescence dense, subglobose, 7–8 cm. long; primary bracts resembling the scape-bracts, suborbicular, almost entirely concealing the axillary branches; branches obscurely compound, densely fasciculate, many-flowered: floral bracts ovate-lanceolate, acute with a terminal mucro 3–4 mm. long, brown-lanate: sepals 15 mm. long, brown-lanate; petals exceed-

ing the sepals, deep blue, mucronate.—N. E. Brown in Bull. Torr. Bot. Club, liii. 466 (1926). Pl. II, figs. 13–14.

TRINIDAD: slopes of Aripo, 1921, *Freeman & Broadway* (Trin); Heights of Aripo, 1922, *Broadway 9917* (Trin, TYPE; phot. G); 1928, *Broadway 6894* (Mo); indefinite, 1862, *Crueger 1748* (Trin).

[Endemic.]

Epiphytic. On the basis of *Crueger 1748*, Mez records *Gravisia exsudans* (Lodd.) Mez from Trinidad, but a comparison of this specimen with the original plate by Loddiges shows the same differences as between it and *G. aquilega* as indicated in the foregoing key.

2. **G. aquilega** (Salisb.) Mez. Plant 1 m. or more high: leaves 1–1.5 m. long, 5–10 cm. wide: scape stout, densely farinose: inflorescence of 10–20 stipitate heads, interrupted-thyrsoid, 4 dm. long; primary bracts lanceolate, broad, reflexed, bright pink, the lower ones much exceeding the axillary heads; floral bracts ovate, pungent, shorter than the sepals, glabrous: flowers 36 mm. long, glabrous; sepals 14 mm. long, pungent; petals mucronate, flavous; ovary 10 mm. long, trigonous.—Mez in Mart. Fl. Bras. iii. pt. 3, 300 (1892). *Bromelia aquilega* Salisb. Parad. Lond. t. 40 (1805). *Aechmea aquilega* Griseb. Fl. Br. W. Ind. 592 (1864).

TRINIDAD: Marabella, 1868, *Finlay 1999* (Trin); Monos, 1889, *Broadway 3509* (Trin); Hort. Trin., 1889, *Broadway 3631* (Trin); 1890, *Broadway 3962* (Trin); Chaguanas, 1890, *Herb. Trin. 4213* (Trin); Aripo Savannah, 1893, *Broadway 5341* (Trin); Hort. Trin., *Herb. Trin. 5571* (Trin); Patos, 1917, *Williams* (Trin); 1924, *Williams, R. O. & A. A. 10716* (Trin); Teteron Bay, 1920, *N. L. Britton 481* (G, NY); Manzanilla, 1921, *Britton, N. L. & E. G. 2192* (G, NY); Oropuche, via Valencia, 1925, *Hombersley* (Mo); indefinite, *Fendler 841 in part*, *Broadway 2187* (Mez!). TOBAGO: Caledonia, *Herb. Trin. 5572* (Trin); Government House grounds, 1910, *Broadway 3639* (NY); indefinite, *Eggers 5677* (NY); *Meyer* (Mez!).

[Venezuela, Guiana, northern Brazil.]

Epiphytic.

12. **AECHMEA** R. & P.

Large or medium-sized stemless herbs. Leaves rosulate, usually linear. Scape usually conspicuous. Inflorescence of various types. Flowers usually sessile. Sepals often asymmetric, usually mucronate. Petals free, bearing two scales near the base or high up. Second series of stamens more or less joined to the petals. Pollen grains with 2 or 4 pores. Style shorter than the stamens, stigma lobes linear, often twisted. Ovules caudate or obtuse. Fruit usually dry. Seeds small, rugose, dark-colored, naked.—Fl. Peruv. Prodr. 47, t. 8 (1794).

Apparently 120 to 130 species. Mexico and the Antilles to northern Argentina.

Key to Species.

1. Inflorescence compound.
   2. Sepals wholly unarmed: branches of the inflorescence polystichous-flowered.....Subgenus *Lamprococcus*.
      1. *Ae. fulgens*.
   2. Sepals mucronate at apex: branches of the inflorescence distichous-flowered.
      3. Margins of the floral bracts free from the rhachis.
         Subgenus *Euaechmea*.
         4. Floral bracts large, forming a tubular sheath about the ovary: branches of the inflorescence short and densely flowered.....2. *Ae. Mertensii*.
         4. Floral bracts minute, much shorter than the ovary, nearly flat: branches of the inflorescence long and laxly flowered.....3. *Ae. porteoides*.
      3. Margins of the floral bracts joined to the rhachis: rhachis excavated.....Subgenus *Platyaechmea*.
         5. Spikes long-stipitate.....4. *Ae. dichlamydea*.
         5. Spikes sessile or very short-stipitate.....Var. *trinitensis*.
1. Inflorescence simple, spicate.
   6. Sepals mucronate at apex, usually free.....Subgenus *Pothuava*.
      5. *Ae. nudicaulis*.
   6. Sepals unarmed.....Subgenus *Macrochordium*.
      6. *Ae. bromeliaefolia*.

1. **Ae. fulgens** Brongn. Leaves densely rosulate, 4 dm. long, 65 mm. wide, subensiform, minutely serrulate, rounded-apiculate: scape erect, glabrous, its bracts lanceolate, entire, roseate: inflorescence compound at base, simple for the upper half, about equalling the leaves, glabrous, red: spikes loosely 3–8-flowered, polystichous; floral bracts none: sepals 5 mm. long, rounded-emarginate, asymmetric, violet; petals 12 mm. long, erect, rounded, ligulate at base, violet changing to red; ovary ellipsoid, 7 mm. thick, epigynous tube conspicuous; ovules long-caudate, borne high in the ovary: berry scarcely enlarged from the ovary.—Brongn. in Ann. Sc. Nat. ser. 2, xv. 371 (1841), as *Aechmaea*.

TRINIDAD: Hort. Trin., 1888, *Broadway 2990* (Trin); 1890, *Broadway 4354* (Trin).

[Northern Brazil.]

Epiphytic. Introduced in cultivation.

2. **Ae. Mertensii** (Meyer) Schult. f. Leaves bulbous-rosulate, 2–6 dm. long; sheath large, ovate; blade 2–5 cm. wide, coarsely spinose-serrate, abruptly acute, mucronate: scape erect, bearing at its apex a tuft of reflexed lanceolate red remotely serrulate bracts: inflorescence at first dense, often becoming lax at maturity, 5–20 cm. long, 4–5 cm. wide, branches densely 4-12-flowered; floral bracts broadly reniform, long-spinose, enfolding the ovary: flowers 12–17 mm. long; sepals free, mucronate, 4–6.5 mm. long; petals yellow,

erect, mucronate, 11 mm. long, their scales fimbriate; ovary subclavate, glabrous, epigynous tube short but distinct; ovules few, long-caudate, borne high in the ovary.—Schult. f. in R. & S. Syst. vii. 1272 (1830). *Bromelia Mertensii* Meyer, Fl. Essequeb. 144 (1818). *Aechmea spicata* Mart. in R. & S. Syst. vii. 1273 (1830). *Ae. mucroniflora* Hook. in Bot. Mag. lxxxi. t. 4832 (1855).

TRINIDAD: Chaguanas, 1868, *Finlay 1998* (Trin); 1889, *Broadway 3714* (Trin); Piarco Savanna, 1893, *Broadway 5287* (Trin); Arima, 1905, *Dannouse* (NY); Princes Town, 1918, *Broadway* (Trin); Tabaquite, 1918, *Broadway* (NY); Dabadie, 1920, *Broadway* (NY); Valencia, 1920, *Britton, N. L. & E. G., & Hazen 1010* (NY); St. Ann's, 1924, *Broadway* (FM, Mo); Laventille upper lands, 1930, *Broadway 7745* (G); indefinite, *Fendler 842, 843* (K); 1930, *Broadway 7431* (G); *2607* (Mez!).

[Guiana, Amazon Basin.]

Epiphytic.

3. **Ae. porteoides** Britton. About 1 m. high: leaves firm, 8 dm. long; sheath large, broadly elliptic; blade linear, 4–5 cm. wide, acute, spinulose-serrate, the spines 2–4 mm. long, black: scape arching (Broadway), terete, densely white-floccose; its bracts broadly lanceolate, membranaceous, pink, deciduous: inflorescence paniculate, equaling or exceeding the leaves, cylindric, very delicately white-stellate-tomentose throughout; lower primary bracts like the scape-bracts, often deciduous, upper primary bracts small and acicular, little larger than the floral bracts; branches fasciculate, spreading, with long sterile base, slender, very laxly few-flowered, strongly geniculate, 6–8 cm. long; floral bracts long-aciculose from a minute ovate base, much shorter than the ovary: flowers 2–3 cm. long, erect or nearly so, sessile; sepals 8–10 mm. long, strongly asymmetric, striate, mucronate with a spine 2–3 mm. long; petals deep violet-purple, 18 mm. long, with two nearly entire scales at base; ovary about 1 cm. long, much enlarged in fruit.—Bull. Torr. Bot. Club, xlviii. 328 (1922). Pl. II, figs. 7–10.

TRINIDAD: Mt. Tucuche, 1893, *Broadway 1997* (Trin); 1920, *N. L. Britton, Hazen & Mendelson 1342* (NY, TYPE, Trin); Heights of Aripo, 1922, *Broadway 9915* (Trin, G, NY); St. Clair, 1913, *P. McLean* (Trin); Morne Bleu, 1921, *N. L. Britton, Freeman & Bailey 2274* (NY); Blanchisseuse Road, 1925, *Broadway 5590* (G, FM); 1926, *Broadway 6008* (Mo); Ortinola Estate, Maracas, 1931, *Broadway 7460* (G); indefinite, *Herb. Trin. 1751, 6620* (Trin).

[Endemic.]

Epiphytic and terrestrial.

4. **Ae. dichlamydea** Bak. Half a meter or more high: leaves 6–8 dm. long, 4–7 cm. wide above the broad subovate base, lingulate, broadly acute, serrulate: scape stout, erect, its bracts lanceolate,

entire, bright red, showy: inflorescence ample, laxly bipinnate, tomentose-lepidote; primary bracts like the scape-bracts, mostly shorter than the sterile bases of the spikes: spikes long-stipitate, distichous, up to 16 cm. long and 3 cm. broad, 5–20-flowered, the rhachis excavated and attached to the sides of the floral bracts; floral bracts boat-shaped but not keeled, strongly nerved, 12–15 mm. long, short-mucronate: flowers sessile; sepals nearly free, mucronate; petals yellow: berry globose, 7 mm. in diameter.—Bak. in Journ. Bot. xvii. 133 (1879). *Ae. bracteata* as used by Bak. Brom. 55 (1889), not Griseb.

TOBAGO: Lot 42, 1913, *Broadway* (G, Mo); road from Charlotteville to Speyside, 1925, *Williams 11142* (Trin); Menna, 1914, *Broadway* (Mo); indefinite, *Greg* (BM, TYPE, phot. G); *Meyer* (Baker!); *Clemens 29; Eggers 5872* (Mez!).

[Jamaica, the Lesser Antilles.]

Epiphytic.

Var. **trinitensis** L. B. Smith (see p. 145). Sterile bases of the spikes short and stout. **Pl. I, fig. 3.**

TRINIDAD: Hort. Trin., 1890, *Hart 4089* (Trin, TYPE, phot. G); 1889, *Broadway 3627* (Trin); indefinite, 1867, *Prestoe* (K); *Herb. Trin. 916* (Trin).

[Endemic.]

Epiphytic.

5. **Ae. nudicaulis** (L.) Griseb. Leaves 5 dm. long, 6–10 cm. broad above the narrow sheath, linear, apiculate, strongly spinose-serrate: scape slender, erect or arching, white-floccose, its bracts erect, elliptic-acute, entire, red, membranaceous, congested at its apex: inflorescence simple, polystichous, cylindric, fertile throughout; floral bracts minute or sometimes wanting, entire: flowers 22 mm. long; sepals free, mucronate, strongly asymmetric; petals 12 mm. long, yellow, acute, bearing the fimbriate scales 4 mm. from the base; ovary subglobose, epigynous tube conspicuous; ovules short-caudate, borne at the middle of the placenta. –Fl. Br. West Ind. 593 (1864). *Bromelia nudicaulis* L. Sp. Pl. 286 (1753).

TRINIDAD: St. Ann's, 1923, *Broadway* (FM); Chaguanas, 1889, *Broadway 3730* (Trin); Hort. Trin., 1889, *Broadway 3630, 3513* (Trin); Marabella Pasture, 1868, *Herb. Trin. 2001* (Trin); indefinite, *Herb. Trin. 2422* (Trin); 1874, *O. Kuntze* (NY); *De Schach, Fendler 834, 835* (Baker!). TOBAGO: indefinite, *Broadway 4830* (Mez!).

[Mexico and the Antilles to southern Brazil.]

Epiphytic.

6. **Ae. bromeliaefolia** (Rudge) Bak. Leaves 6–10 dm. long, 5 cm. broad above the large ovate sheath, linear, usually rounded by decay of the point, coarsely spinose-serrate: scape stout, densely

white-lanate, its bracts ovate-lanceolate, entire, densely imbricate: inflorescence simple, polystichous, densely cylindric, 7–15 cm. long, 35 mm. wide, fertile throughout, densely white-lanate; floral bracts broader than long, truncate, thickened, 2-keeled: flowers 17 mm. long; sepals 7 mm. long, joined at base for 2 mm., emarginate; petals 15 mm. long, erect, emarginate, greenish-yellow soon turning black, scales borne 5 mm. from the base, fimbriate; ovary tomentose; ovules borne high in the ovary, long-caudate.—Bak. in Benth. & Hook. f. Gen. iii. 664 (1883). *Tillandsia bromeliaefolia* Rudge, Pl. Guian. 32, t. 50 (1805). *Macrochordium melananthum* Beer, Brom. 146 (1857).

TRINIDAD: Cabacera de Aripo, 1869, *Herb. Trin. 2002* (Trin); 1873, *Herb. Trin. 698* (Trin); Arima, 1874, *O. Kuntze 988* (NY); Carapichaima, 1892, *Alexander 5723* (Trin); Balandra, 1922, *Freeman 10505* (Trin); indefinite, *Fendler 837; Prestoe* (Baker!).

[Venezuela, Guiana, Brazil, Paraguay, Bolivia, Argentina.]

Terrestrial or epiphytic in forest.

13. **ANANAS** Mill. Pineapple.

Leaves densely rosulate, scarcely enlarged at base, acuminate-pungent, spinose-serrate. Scape about equaling the leaves, spiny-bracted. Inflorescence densely strobiliform, crowned with a tuft of sterile bracts. Flowers sessile, violet or red. Sepals free, obtuse, slightly asymmetric. Petals free, erect, ligulate. Stamens included, pollen grains ellipsoid, with 2 pores. Ovary coalescing with the bracts and axis to form a fleshy compound fruit, epigynous tube short. Ovules borne near top of cell. Berry sterile in cultivated forms.—Gard. Dict. Abr. ed. iv. (1754).

A single rather variable species, native of Brazil and probably also the Guianas but widely cultivated.

1. **A. sativus** Schult. f. Typical specimens small, with fruit only slightly fleshy; cultivated specimens quite large, with a succulent fruit and aborted ovules.—R. & S. Syst. vii. 1283 (1830). *Bromelia Ananas* L. Sp. Pl. 285 (1753). *Ananassa sativa* Lindl. in Bot. Reg. xiii. sub t. 1068 (1827).

TRINIDAD: vicinity of Valencia, 1921, *Britton, N. L. & E. G. 2107* (NY).

Terrestrial; introduced and sparingly cultivated in Trinidad. Naturalized in the Mora Forest district.

14. **BILLBERGIA** Thunb.

Stemless plants. Leaves rosulate or rarely fasciculate, sheath large, blade linear, spinulose-serrate, often banded. Scape erect or

arching, its bracts red, membranaceous. Inflorescence simple or compound. Flowers showy. Sepals free, erect, usually obtuse. Petals free, actinomorphic or zygomorphic, bearing two scales, claw long, blade elliptic. Stamens exserted at anthesis, both series free, or the second joined to the petals only as high as the scales. Pollen grains with longitudinal folds, but no pores. Style exceeding the stamens, epigynous tube large. Ovules many, obtuse.—Decad. Pl. Bras. iii. 30 (1823).

About 50 species. Chiefly Brazilian with outlying species in the rest of South America and in Central America and Trinidad.

Key to Species.

Inflorescence cylindric: petals becoming spirally recurved at anthesis: ovary verrucose.....1. *B. rosea.*
Inflorescence densely pyramidal: petals twisted, not spiral at anthesis: ovary not verrucose.....2. *B. pyramidalis.*

1. **B. rosea** Beer. Leaves 1 m. long, 50 mm. broad above the narrowly ovate brown sheath, densely and finely spinulose-serrate, conspicuously spotted: scape slender, nutant, densely white-farinose, its bracts ovate-lanceolate: inflorescence simple, spicate, many-flowered, white-farinose throughout; bracts 4 mm. long, semiorbicular, obtuse: flowers sessile, 85 mm. long, erect; sepals narrowly triangular, 12, 10, and 10 mm. long respectively, verrucose; petals 65 mm. long, acute, with crenate scales, yellowish green; ovary broadly ovoid, densely granulose: berry yellow, globose, 10 mm. in diameter.—Brom. 128 (1857).

TRINIDAD: indefinite, Hort. Kew (Mez!).
[Dutch Guiana.]

Introduced in cultivation.

2. **B. pyramidalis** (Sims) Lindl. Leaves tubular-rosulate, 1 m. long, densely and finely spinulose-serrate, 6 cm. broad above the ovate base, often spotted: scape erect, white-farinose, its bracts lanceolate: inflorescence simple, pyramidal, 15 cm. long, white-farinose, rhachis stout, straight; floral bracts minute, acute: flowers 65 mm. long, obscurely short-stipitate; sepals 17 mm. long, pale reddish, densely farinose; petals 52 mm. long, obtuse, red, twisted at anthesis, scales fimbriate; anthers 7 mm. long, linear; ovary subcylindric, densely farinose, epigynous tube short.—Bot. Reg. xiii. sub t. 1068 (1827). *Bromelia pyramidalis* Sims in Bot. Mag. xlii. t. 1732 (1815).

TRINIDAD: Hort. Trin., 1890, *Broadway 4405* (Trin); St. Joseph, cultivated, 1917, *H. Fuller 8951* (Trin).
[Eastern Brazil.]

Introduced in cultivation.

Explanation of Plates.

Plate I.

Fig. 1. Deuterocohnia Meziana O. Ktze. (*O. Kuntze*), flower and section of branchlet × 1.
2. Same, sepal × 1.
3. Aechmea dichlamydea Bak. var. trinitensis L. B. Smith (*Hart in hb. Trin. 4089*), spike × ½.
4. Canistrum minutum (Mez) L. B. Smith (*L. B. Smith, Hoehne & Kuhlmann 1829*), flower × 1.
5. Same, petal and stamens × 1.
6. Tillandsia latisepala L. B. Smith (*F. L. Herrera 3313*), inflorescence × ½.
7. Same, sepal × 1.
8. Hohenbergia oligosphaera (Bak.) Mez (*N. L. Britton, Freeman & Nowell 2581*), floral bract × 1.
9. Vriesia Broadwayi L. B. Smith (*Broadway in hb. Trin. 9916*), habit × ¼.
10. Same (*N. L. Britton, Hazen & Mendelson 1258*), flower and capsule × 1.
11. Vriesia Hoehneana L. B. Smith (designed from a photograph), habit much reduced.
12. Same (*L. B. Smith 1945*), terminal section of spike × ½.
13. Same (*Hoehne in hb. S. P. 4724*), petal and stamen × 1.
14. Tillandsia Archeri L. B. Smith (*W. A. Archer 1204*), habit × ¼.
15. Same, spike × 1.

Plate II.

Fig. 1. Tillandsia didistichoides Mez (*Fendler 827*), habit × ¼.
2. Same (*Broadway 7433*), floral bract and flower × 1.
3. Same, petal and stamen × 1.
4. Guzmania plicatifolia L. B. Smith (*Tonduz in inst. phys.-geogr. nat. Costaric. 12, 533*), spike × 1.
5. Same, flower and capsule × 1.
6. Guzmania rosea L. B. Smith (*Lehmann K 355*), floral bract and flower × 1.
7. Aechmea porteoides Britton (*Broadway 7460*), fascicle of branches × ½.
8. Same, sepal × 1.
9. Same, petal and stamens × 1.
10. Same, pollen grain × 250.
11. Glomeropitcairnia erectiflora Mez (*J. R. Johnston 303*), spike × ½.
12. Same (designed from a photograph), habit much reduced.
13. Gravisia aripensis N. E. Brown (*Broadway 9917*), habit × ¼.
14. Same, rear view of branch × ¼.

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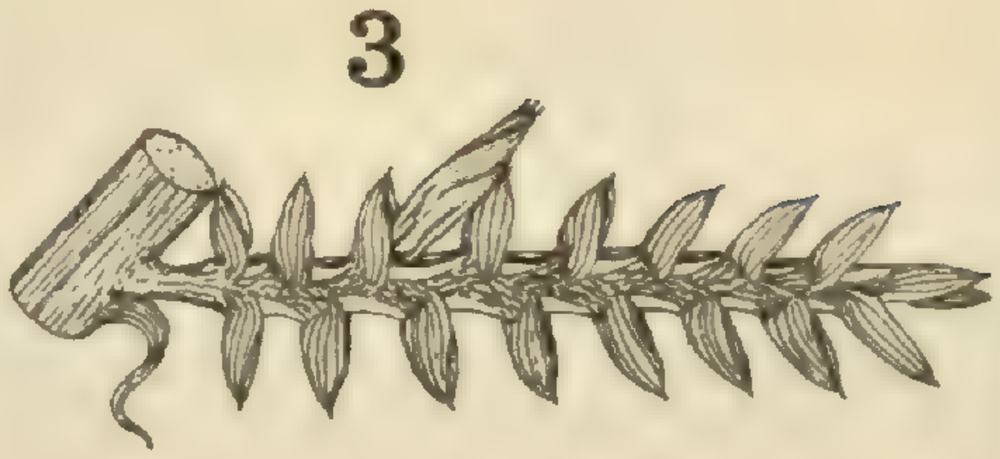

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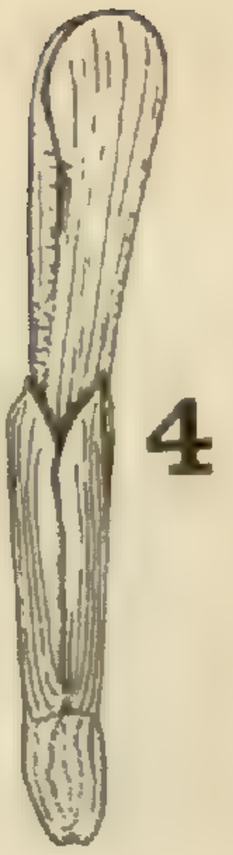

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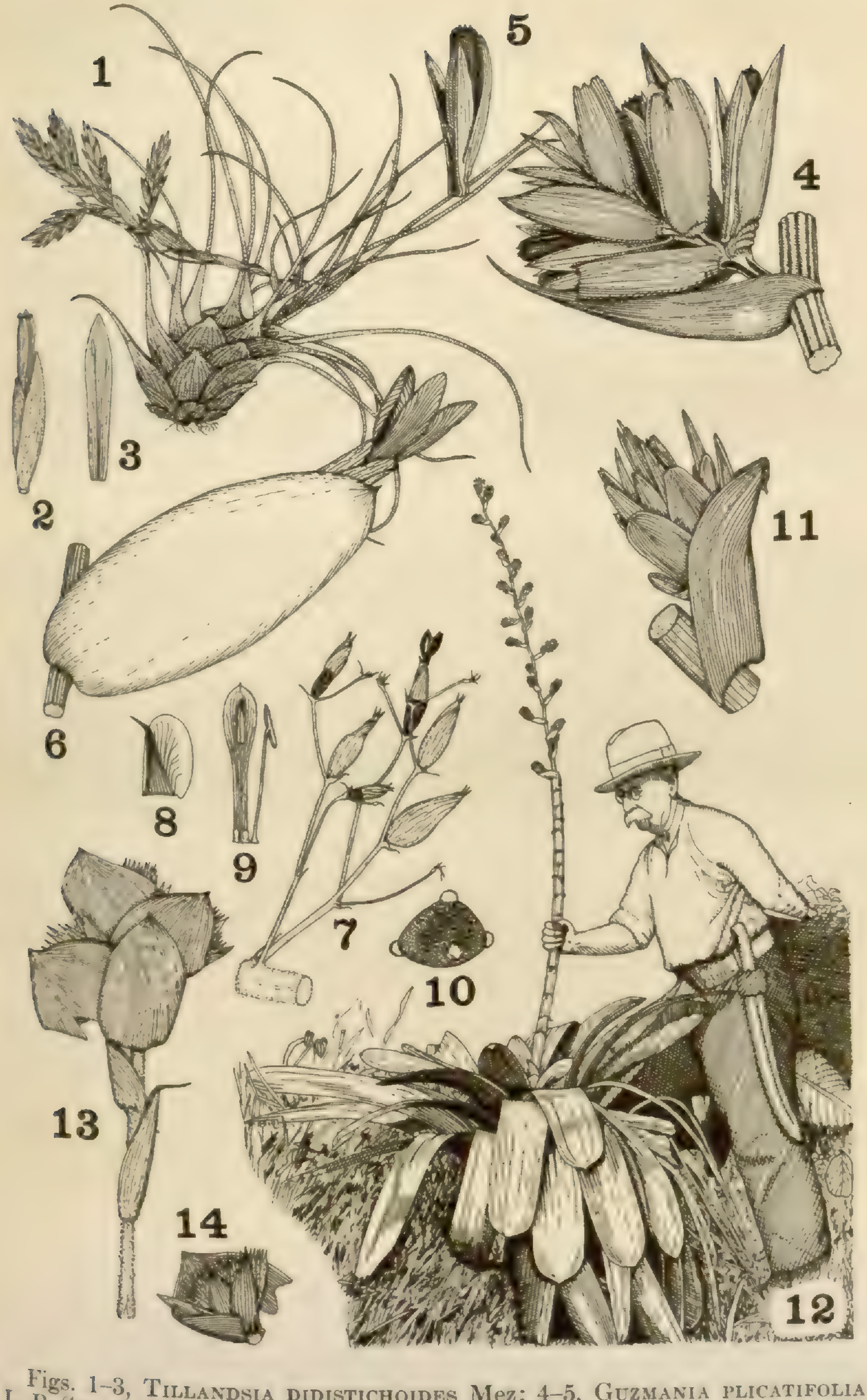
Figs. 1–2, DEUTEROCOHNIA MEZIANA O. Ktze.; 3, AECHMEA DICHLAMYDEA Bak. var. TRINITENSIS L. B. Sm.; 4–5, CANISTRUM MINUTUM (Mez) L. B. Sm.; 6–7, TILLANDSIA LATISEPALA L. B. Sm.; 8, HOHENBERGIA OLIGOSPHAERA (Bak.) Mez; 9–10, VRIESIA BROADWAYI L. B. Sm.; 11–13, V. HOEHNEANA L. B. Sm.; 14–15, TILLANDSIA ARCHERI L. B. Sm.



Figs. 1–3, TILLANDSIA DIDISTICHOIDES Mez; 4–5, GUZMANIA PLICATIFOLIA L. B. Sm.; 6, G. ROSEA L. B. Sm.; 7–10, AECHMEA PORTEOIDES Britton; 11–12, GLOMEROPITCAIRNIA ERECTIFLORA Mez; 13–14, GRAVISIA ARIPENSIS N. E. Brown.

CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY.

CIII.

REALIGNMENTS IN THE GENUS PANICUM.

By M. L. Fernald.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CIII.

REALIGNMENTS IN THE GENUS PANICUM

M. L. Fernald

No large genus of the *Monocotyledoneae* in eastern North America can compare for difficulty of satisfactory classification with *Panicum;* and within the genus by far the most baffling aggregation is that strictly North American series which has been designated as the subgenus *Dichanthelium* Hitchc. & Chase, the heteromorphous series often called the *Dichotomum*-group, from *P. dichotomum* L., the type of the subgenus, to which at one time or another most of the species with small spikelets have been referred. After Linnaeus, the earlier systematists, mostly with conservative or orthodox conceptions of specific values, proposed, within this dominant Atlantic American group, a fair number of unquestioned species: *P. depauperatum* Muhl., *laxiflorum* Lam., *ciliatum* Ell., *strigosum* Muhl., *aciculare* Desf., *consanguineum* Kunth, *angustifolium* Ell., *microcarpon* Muhl., *spretum* Schultes, *lanuginosum* Ell., *ovale* Ell., *sphaerocarpon* Ell., *polyanthes* Schultes, *tenue* Muhl., *ensifolium* Baldw., *chamaelonche* Trin., *lancearium* Trin. and *commutatum* Schultes, and several with larger spikelets. With these well attested names to shuffle, the next two or more generations were mostly content to leave well enough alone and to recognize something as probably meant by these and some other names (now ranked as synonyms) of the same post-Linnean period.

Then, with more intensive exploration, especially of the Coastal Plain, where *Panicum*, subg. *Dichanthelium* is dominant, Scribner, of

a conservative school, or Scribner and his associates proposed a few of our best-marked species: *P. linearifolium, ovinum, Wrightianum, Thurowii, columbianum* and *equilaterale*. There was, furthermore, no balking at the reduction of intergradient plants to varietal rank or to complete synonymy: *P. Ashei* reduced to *P. commutatum, P. tennesseense* to *P. lanuginosum*, and *P. patulum* treated as a variety of *P. lancearium* (as *P. Nashianum patulum*). Then, with the ultra-democratic or radical reaction against orthodoxy and good usage which found expression in such gems as "Asa Gray didn't know where he was at!" and "Now the day of authority is ended," *Panicum* suddenly became a favorite source of proposed new species, especially by younger men with little or no background of general scholarship and with a minimum of experience in exact and judicious consideration of other groups, whose specific evaluations were of a conveniently mechanical uniformity not consistent with the behavior of plants in Nature. For several years Ashe and Nash held the field. The recognition of such species of the former as *P. calliphyllum, annulum, mattamuskeetense, yadkinense, roanokense, lucidum, meridionale* and *subvillosum* definitely clarifies our understanding of the group; but such remarkable names of Ashe as *P. arenicolum, filiramum, Cahoonianum, huachucae, orangensis, shallotte, parvipaniculatum* and *glabrissimum* can, fortunately, be forgotten in synonymy. Similarly, our understanding of the genus is greatly helped by the recognition of Nash's *P. perlongum, boreale, leucothrix, villosissimum* and *malacophyllum;* but there is little intellectual or taxonomic satisfaction in attempting to keep apart as species his *P. Clutei, paucipilum, atlanticum* and *tsugetorum*.

American botanists have to thank Hitchcock & Chase for their very exacting and remarkably complete study of the genus which appeared in 1910 as *The North American Species of Panicum*.[1] The making of the very detailed keys alone must have required months of work; the trailing of types and the careful drawing of their spikelets, with critical notes upon the type-specimens, are, surely, the result of years of careful research; furthermore, the very illuminating discussions after the descriptions aid tremendously in the interpretation of the specific concepts maintained. For all these features every close student of our flora must be grateful. It would, consequently, be most gratifying if the evaluations of species in the book

[1] Contrib. U. S. Nat. Herb. xv. (1910).

could all be accepted as they stand. But a close study of the work shows that two quite different groups of plants are accepted as species: 1st, the entities with sharply defined and constant or essentially constant characters in inflorescences or spikelets: *P. flexile, Gattingeri, virgatum, verrucosum, consanguineum, fusiforme, boreale, caerulescens, praecocius, thermale, sphaerocarpon, polyanthes, ensifolium, chamaelonche, Wilcoxianum, malacophyllum, Leibergii, xanthophysum, scoparium, scabriusculum, clandestinum, latifolium* and *Boscii;* and 2d, a large series of plants which are separated as "species" on "more or less" differences of an inconstant nature. Illustrative of this second group are many plants which the older systematists would unquestionably have treated as variations of other species and which a gratifyingly large group of students today would still so treat: *P. capillare* and *barbipulvinatum; P. longifolium* and *Combsii; P. anceps* and *rhizomatum; P. linearifolium* and *Werneri, P. laxiflorum* and *xalapense; P. mattamuskeetense* and *Clutei; P. dichotomum* and *barbulatum; P. meridionale* and *albemarlense; P. Lindheimeri* and *implicatum, huachucae, tennesseense, lanuginosum* and *languidum,* with essentially identical spikelets and 1st glumes; *P. villosissimum, pseudopubescens* and *scoparioides; P. Commonsianum* and *Addisonii; P. tsugetorum* and *columbianum; P. lanceariuni* and *patulum; P. Helleri, Scribnerianum* and *oligosanthes; P. Ashei, commutatum* and *Joorii.*

In some cases active field-botanists have already protested the separation as species of members of some of these twins, triplets or sextets. Thus, in his scholarly *Plants of Southern New Jersey,* Dr. Witmer Stone speaks of "*P. albemarlense,* a species which so far as New Jersey material goes I find it impossible to separate from *P. meridionale*,"[1] and also says "So many New Jersey specimens are regarded as intermediate between *commonsianum* and *addisonii* by Hitchcock and Chase, to whom they were submitted, that it seems more reasonable to regard them as subspecies rather than as full species."[2] Wiegand & Eames, in their *Flora of the Cayuga Lake Basin,* feel that *P. tsugetorum* is "Perhaps only varietally distinct from *P. heterophyllum* [*P. columbianum*]"[3]; personally I can't get even a variety out of it. In 1929 the acute taxonomist of Indiana, C. C. Deam, in the main faithfully accepting the specific evaluations

[1] Stone, Pl. So. N. J. 203 (1910).
[2] Stone, l. c. 206 (1910).
[3] Wiegand & Eames, Fl. Cayuga L. Basin, 89 (1926).

of Hitchcock & Chase, occasionally showed a wholesome independence. "Our Indiana specimens show some variation and some have been named for me as *Panicum barbulatum* Michx. This species is separated from *Panicum dichotomum* L. by its more pubescent nodes, ... I have studied our species carefully and I believe a division of them is not warranted."[1] Of *P. tennesseense* he said: "I think all of my specimens could be safely referred to *Panicum huachucae*, regarding them as a glabrous form of that species";[2] and he specially noted his difficulty in separating *P. tsugetorum* from *P. columbianum* and *P. Ashei* from *P. commutatum*.

In the same year Weatherby, Knowlton & Bean expressed a widespread feeling in regard to the group:

> As to *Panicum*, we are inclined heartily to second the remark of Professors Wiegand and Eames (Cornell Univ. Agric. Exp. Sta. Mem. xcii. 83 (1926), that "the separation of species . . . on the basis of degree of pubescence is to be regretted." Hitchcock and Chase have rendered invaluable service in patiently tracking down the types of all such proposed species and definitely placing them in a taxonomic scheme. Many of them they have reduced to synonymy. After a long pursuit of vanishing "characters" through a maze of slightly differing herbarium specimens, we suspect that the reduction might profitably be carried further. Are there any real specific lines between *P. columbianum*, *P. tsugetorum*, and *P. subvillosum; P. meridionale* and *P. albemarlense?* Where does *P. columbianum*, var. *thinium* leave off and *P. meridionale* begin? Was Bicknell, a keen observer and by no means averse to recognizing close species, right in reducing *P. oricola* to *P. meridionale* and in maintaining *P. Owenae;* or are Hitchcock and Chase, fortified by long monographic study of the genus, correct in reducing *P. Owenae* and retaining *P. oricola?*
>
> Such questions we have, for the most part, been unable to answer satisfactorily; we have, as the most practicable method, here maintained, at least as varieties, nearly all the species recognized in recent treatments, so far as we are able to make them out in the material at hand. We have, however, accepted with a good deal of relief Prof. Fernald's telescoping of *P. Lindheimeri*, *P. huachucae*, etc., into a single species. This arrangement gives, in New England, natural ranges; and it is conducive to ease in naming specimens, a quality which should appeal strongly to anyone condemned to struggle with this group. We have followed Dr. Hitchcock's earlier reduction of *P. Clutei* to synonymy under *P. mattamuskeetense* in preference to his later re-separation of the two. *P. oligosanthes* we have omitted altogether. Material of it from the southeastern states is at least varietally distinct from *P. Scribnerianum*, and the latter may stand as a species, as species go in *Panicum;* but the New England collections referred to *P. oligosanthes* appear to us to represent only slender states of *P. Scribnerianum*. New England reports of *P. lucidum* seem also to be erroneous.[3]

[1] Deam, Grasses of Indiana, 265 (1929).
[2] Deam, l. c. 275 (1929).
[3] Weatherby, Knowlton & Bean, Rhodora, xxxi. 107 (1927).

Still more recently, Weatherby & Griscom, reporting on their field-experiences in South Carolina, found, as others have before them, the greatest confusion of the characters relied upon by Hitchcock & Chase to separate *Panicum xalapense* from *P. laxiflorum* and concluded: "it appears to us . . . . that *P. xalapense* is doubtfully separable."[1]

Somewhat earlier, as a result of attempting of understand certain tangled ("implicated") groups in *Panicum*, I had "telescoped" some of the entities which Hitchcock & Chase accept as true species: *P. barbipulvinatum* reinstated as a variety, *P. capillare*, var. *occidentale* Rydb.[2] (Surely, if Rydberg could see in it only a variety, its specific status might well be open to doubt); *P. Werneri* placed under *P. linearifolium* as a glabrous variety;[3] and *P. Lindheimeri*, *huachucae*, *tennesseense*, *implicatum* and *languidum* treated as a hopelessly intergradient series of variations.[4] This treatment has found reflection in the work of several later students and in writing of the group in 1930 Dr. J. M. Fogg, Jr., noted specimens of what seemed to him one plant as identified for him, some as *P. implicatum*, some as *P. huachucae*, some as *P. huachucae*, var. *silvicola;* and he stated that in his judgment "there is a well marked *meridionale* extreme and an equally characteristic *oricola* one, but between them an almost complete series of intergradations."[5]

More recently, trying again to gain a clear conception of the genus in northeastern America, I have found myself wholly in accord with the conservative views of Stone, Wiegand & Eames, Deam, Weatherby, Knowlton & Bean and Weatherby & Griscom and other field-botanists who have written me of their judgments; and I have accepted as a duty the quite unwelcome task of realigning several members of the genus, as discussed in the succeeding pages. In most of these cases, it will be noted, it is necessary only to study the very illuminating comments of Hitchcock & Chase in order to detect the confluent plants, the groups of variations which I have designated as the 2d series which they recognize as true species.

The recognition of mere tendencies or variations in response to edaphic or ecological conditions as species is too common but it completely obscures one of the most important and far-reaching laws

[1] Weatherby & Griscom, Rhodora, xxxvi. 35 (1934).
[2] See Fernald, Rhodora, xxi. 111 (1919).
[3] Fernald, Rhodora, xxiii. 194 (1921).
[4] Fernald, l. c. 141 and 223–228 (1921).
[5] Fogg, Rhodora, xxxii. 233 (1930).

of evolution, which should be at the bottom of all sound taxonomy; and, in view of the great need of scholarly and thoroughly trained taxonomists, so much emphasized in several public meetings in recent years, such a standard of values can hardly prove convincing to the really earnest and thoughtful young students whom we wish to enlist. Fortunately, they are still idealists and they are naturally attracted to the fields in which scholarly thoroughness is evident. When a plant or a series of specimens has no definite and constant character of the reproductive (conservative) structures, but differs only in having thinner or thicker leaves, weaker or stiffer culms, greater or less development of pubescence, or greener or more purple foliage, it is safe, judging from common experience of many good field-observers, to look to differences of habitat (of shade and sunshine, of chemical reactions of the soil or of moisture and aridity) as largely controlling these simple responses. Nevertheless, upon just such ecological responses somewhat intensified and upon little or no difference in the shape of spikelet or of its 1st glume have *P. languidum* and *P tennesseense* been separated from *P. huachucae* and *P. Lindheimeri*, *P. albemarlense* from *P. meridionale*, *P. pseudopubescens* and *P. scoparioides* from *P. villosissimum*, *P. patulum* from *P. lanceariun* and *P. Joorii* from *P. commutatum*.

The recognition of such tendencies as true species and the illogical disinclination to call them varieties (or merely forms or states in some cases) has had many advocates. One of the most consistent defenders of as yet not sharply differeniated plants as "species" was the late Dr. Rydberg. So consistent was Rydberg's attitude on this point, that it is almost startling to find an occasional variety designated by him.[1] Rydberg's philosophy, clearly expressed, was stated to the International Congress of Plant Societies at Ithaca:

> Until we have discovered and described all, or most, of the great number of yet unknown forms, and until the species have been tested by cultivation, breeding, changing of soil environment, etc., they naturally have to remain tentative. I leave it to others to find out whether the characters, prominent or trifling as they may be, on which they are based, are constant enough to place them as distinct species. I think that I have done a service to taxonomy if I have pointed out existing characters. I also think that a form that is worth describing, also should have a name.

[1] Some years ago I chanced to overhear a bit of conversation at the Gray Herbarium, which others should enjoy. Miss Alice Eastwood was catechizing Rydberg regarding one of his segregations, which he defended as necessary in order that he should be consistent. Miss Eastwood retorted, "Hang consistency!", to which came the rejoiner in Rydberg's high-pitched voice: "Some folks would call that female."

I prefer a binomial. When I use a binomial I do not pretend that it means the same as a species in Hall-Clements style. I do not pretend to be able to pass on its rank, because in most cases it is impossible.[1]

Somewhat earlier Rydberg had expressed his view of species in these words: "My intention is not to defend them [his own segregates] as species. The limitation between species and variety will always be arbitrary, so also between variety and form [therefore call every recognizable trend a "species"!]. . . . What he [Fernald] and many others call varieties, I call species."[2] Some others with the same philosophy are readily recalled and the defenders of many of the "redundant"[3] Panicums can hardly be called conservative.

Nevertheless, although in some cases, especially of plants described from scrappy bits of specimens otherwise quite unknown to the phytographer, the constancy of characters cannot always be confidently asserted, it certainly cannot be rightly maintained that an experienced and careful taxonomist, after many years of study of plants in the field and in the herbarium, can "not pretend to be able to pass on its rank," and that "in most cases it is impossible." Surely, when the common experience of really careful and thoughtful observers and the large accumulation of specimens in our greater herbaria shows a plant essentially invariable in its fundamental reproductive characters, it is quite possible (even simple) to note its vast difference from a series which lacks stability in the same characters. Many justly honored taxonomists have clearly comprehended that there are such differences; and the differentiation between true or stable species, on the one hand, as opposed to inconstant or unstable ones, on the other, is absolutely necessary if taxonomy is to hold its honored place in science. It is almost a truism that "conservative" and essentially unvarying species characterize the more ancient floras and faunas—the relic species persisting from the earlier geological epochs in the evolution of plants and animals. It is equally a truism, that in recently disturbed or altered areas a stimulation and multiplication of variations has occurred and that under such conditions inconstant and plastic species luxuriate. The members of *Panicum*, subg. *Dichanthelium* have their greatest development on the relatively youthful Atlantic coastal plain of North America, and the subgenus shows its youth, in the first place, by its

[1] Rydb. in Proc. Intern. Congr. Pl. Sci. ii. 1544, 1545 (1929).
[2] Rydb. Bull. Torr. Cl. xxxviii. 352–354 (1911).
[3] See Rhodora, xxiii. 141 (1921).

multiplication of variations and its aggressiveness, in the second, by its restriction to North America, with most of its species on or near the geologically young coastal plain.

The relative youth of *Panicum* subg. *Dichanthelium* is strikingly contrasted with the great age of some other members of the *Paniceae*. *Valota*, for instance, is a small genus (about 12 species) sharing warm parts of America with Australia; and *Leptoloma* has one very uniform species in North America, the other three in Australia. Since Australia was cut off from its connection with the other continents by mid-Cretaceous time, it follows that *Valota* and *Leptoloma* have had a tremendously long existence; their species are few and stable. *Panicum*, subg. *Dichanthelium*, restricted to North America, where it is chiefly developed in the most youthful regions, and without representation in the ancient flora of Australia, is, by inference at least, a more youthful group. Its behavior certainly so indicates. Is it not significant, therefore, that this group should contain so many poorly differentiated, so-called "species"? Failure to recognize that they belong to a different class from the stable and ancient species obscures one of the most illuminating demonstrations of evolution we have in our living flora.

After Rydberg had expressed at Ithaca his inability to judge the validity of his own generic and specific segregations, Dr. Skottsberg made a trenchant and very sound reply. His telling examples and direct refutation of the weak attitude of the extreme "splitter," especially of genera, should be carefully studied by all who are not beyond redemption. It is impossible here to republish his complete rejoinder, but I may be pardoned for passing on certain pregnant passages, even though they deal primarily with generic, rather than specific, segregation. The principles involved are equally applicable to the segregation of confluent "species."

What do we gain by splitting? In some cases, in many perhaps, the operation is necessary. If we find a black sheep hidden in an otherwise natural genus, small or large, drive it out, of course, and make a new genus for it, if this be necessary. Nobody will fail to give you credit for that. . . . But apart from such instances, what can the reason be for these almost convulsive efforts to segregate everywhere? Some people say there is a good deal of personal vanity at the bottom of it, but that I refuse to believe. A serious taxonomist will do no such thing. No, as Dr. Rydberg told us in his paper: when a genus becomes "too large" it is time to split it up so that we may get a better oversight over it. I cannot see the point there. As if a large genus would become easier to handle only because we call its sections genera? Have we really got a

better and clearer idea of the genus *Cereus* after Britton and Rose cut it up into 75 pieces? Those who think so, deceive themselves. We get lots of new names to remember and scores of new synonyms to keep a record of, that is about all—we do not gain a single thing by making genera sub-tribes and sections genera, but we lose a great deal. We lose the firm hold on good natural groups, we lose useful and pleasing associations of minds, more so if we put, as is done so often now, equal weight on vegetative as on floral characters. We efface interesting facts regarding geographical distribution. I think it is quite fascinating to observe how a genus like *Viola*, a very natural genus indeed, has developed, under different conditions, . . . Split up this genus, and that wonderful display of life-forms passes out of sight. Had the Hawaiian species grown in Oregon and the Andean in the Rocky Mountains they would not have been violets any more. For if the genus *Pinus* is split, anything may happen.

Suppose we have a natural genus (taken in a wide, conservative sense) that has developed one section in Europe, another in Asia, a third in America, showing characters that give us certain hints as to the early history of the genus and at the same time so well separated from each other that the splitter has a fair chance to set to work, will it not appear to us that we know, as it were, less about the three new genera than about the single old one unless we are able always to remember that, once upon a time, the three used to be one?

. . . . . .

The limitation of genera is a matter of both good knowledge—and of the whole assemblage, not only of the species in one section of the area—and good taste. . . .

It would be well if those who are less keen on changes for changes' own sake would join in an appeal to those who believe that change in taxonomy always means development, asking them, before they spoil a good old genus, to stop and ask themselves: what does botany gain? Are not, after all, these new genera like rockets, rising with brilliancy only to slump down and fall into oblivion, increasing the burden of synonyms that all of us curse?[1]

As already stated, the conservative viewpoint, so well expressed by Skottsberg regarding genera, applies equally well to species. The inordinate segregation of species without sharp differentiations truly "effaces interesting facts."

PANICUM LONGIFOLIUM Torr., var. **Combsii** (Scribn. & Ball), comb. nov. *P. combsii* Scribn. & Ball, U. S. Dept. Agr. Div. Agrost. Bull. no. 24: 42, fig. 16 (1901).

P. LONGIFOLIUM, var. **pubescens** (Vasey), comb. nov. *P. anceps*, var. *pubescens* Vasey, U. S. Dept. Agr. Div. Bot. Bull. no. 8: 37 (1889).

Panicum longifolium Torr., originally described from New Jersey, has four usually well-defined but clearly confluent geographic varieties: var. *tusketense* Fern., RHODORA xxiii. 192 (1921), known only

[1] Skottsberg, Proc. Internat. Congr. Pl. Sci. ii. 1554, 1555 (1929).

from the valley of the Tusket River in Nova Scotia; typical *P. longifolium*, following the Coastal Plain from southeastern Massachusetts to Florida; var. *Combsii*, extending from southern Georgia and northern Florida to Louisiana; and var. *pubescens* occurring, likewise, from Florida to Louisiana. The diagnostic characters of the four varieties follow.

a. Plants 2–9 dm. high; culms 1–3 mm. broad at the 1st exposed node; principal sheaths 0.5–1.5 dm. long, 15–40-nerved at summit, glabrous (exceptionally villous); longer blades 1–3.5 dm. long, 3–6 mm. broad, glabrous (exceptionally villous); larger panicles 0.3–2.3 dm. long, 0.1–1.5 dm. broad. ....*b.*

b. Branches and branchlets of panicle ascending, the mature branchlets appressed or subappressed.

Spikelets 2–3 mm. long, the 2nd glume equaling or longer than the sterile lemma; longer branches of panicle 3–14 cm. long.....*P. longifolium* (typical).

Spikelets 2.6–3.4 mm. long, the 2nd glume usually shorter than the sterile lemma; longer branches of panicle 0.1–8 cm. long.....Var. *tusketense.*

b. Branches and branchlets of mature panicle strongly (often horizontally) divergent; spikelets 3–4 mm. long, with tips often sharper; 2nd glume equaling or slightly exceeding the sterile lemma; longer branches of panicle 5–10 cm. long.....Var. *Combsii.*

a. Plants 8–10 dm. high; culms 3–6 mm. broad at the 1st exposed node; principal sheaths 1–2.5 dm. long, 25–50-nerved at summit, usually densely villous; longer blades 3–7 dm. long, often overtopping the panicle, 5–8 mm. broad, usually villous; larger panicles 2–4 dm. long, 1–2 dm. broad, in maturity with horizontally divergent branches and branchlets; spikelets 2–2.5 mm. long.....Var. *pubescens.*

Typical *P. longifolium*, described by Torrey from "the pine barrens of New Jersey," with "*Culm* about 2 feet high . . . . *Sheaths* . . . somewhat hairy at the throat" but otherwise the "whole plant very smooth," the "*Panicle* with few appressed branches," is the only variation of the species found north of Georgia, except for the superficially similar but isolated Nova Scotian var. *tusketense*. On the basis of pubescence of foliage (a most fickle vegetative character) the 51 sheets before me of typical *P. longifolium* and var. *tusketense* fall into the following grouping.

Foliage strictly glabrous (except for ligule), 41: Nova Scotia, 12; Massachusetts, 4; Rhode Island, 7; Connecticut, 7; New Jersey, 5; Maryland, 2; Georgia, 1; Florida, 3.

Sparse villosity on 1 or more sheaths or blades, 9: Connecticut, 1; New Jersey, 4; Delaware, 1; Virginia, 1; Georgia, 1; Florida, 1.

Abundant and conspicuous villosity on sheaths and blades, 1: Delaware, 1.

From these figures it is clear that typical *Panicum longifolium* is an

essentially glabrous plant, "whole plant very smooth," to use Torrey's diagnostic phrase. Consequently, in vainly attempting to find the specific lines which separate from it *P. Combsii*, it is at least not reassuring to find them stated by Hitchcock & Chase as follows:

> This species [*P. Combsii*] is closely related to *P. longifolium* from which it may be distinguished by its shorter blades, longer spikelets, and usually by the lack of pubescence.

In their key Hitchcock & Chase (N. Am. Pan., Contrib. U. S. Nat. Herb. xv. 99) group *P. longifolium* and *P. Combsii* under the call:

> Ligules ciliate; basal leaves half as long as culm or more; panicle much exceeding the upper leaves.

Certainly it is most difficult to detect any constant difference in the foliage of the two. We then hopefully turn to the stated diagnostic characters:

> Spikelets not over 2.7 mm., usually 2.5 mm. long, the first glume less than half that length; ligules 2 to 3 mm. long..53. *P. longifolium.*
> Spikelets 3 to 3.5 mm. long; first glume two-thirds to three-fourths that length; ligule less than 1 mm. long..... 54. *P. combsii.*

In the original diagnosis of *P. Combsii*, Scribner & Ball, likewise, described the "first glume . . . two-thirds to three-fourths the length of the spikelet"; but their illustration of the plant might well have been drawn from a New Jersey, New England or Nova Scotian specimen of *P. longifolium*, for the artist showed the first glume only two-thirds the length of the spikelet, a proportion not difficult to find in specimens of *P. longifolium* all the way north to Nova Scotia. I have carefully measured characteristic spikelets and their first glumes in all three series with the result shown in the accompanying table.

Typical P. LONGIFOLIUM		1st Glume.	Spikelet.	Proportion (per cent)
Marion, Massachusetts,	*Fernald*, no. 783	1.7 mm.	2.8 mm.	.53
Dartmouth, Massachusetts,	*Eaton & Griscom*	2	3	.66
Pasque I., Massachusetts,	*Fogg*, no. 3787	1.9	3	.63
Hopkinton, Rhode Island,	*Collins & Fernald*, no. 11,245	1.5	3	.50
Lake Worden, Rhode Island,	*Faxon*	1.8	3	.60
Westerly, Rhode Island,	*Ware et al.*	1.9	3	.63
Richmond, Rhode Island,	*Fernald & Collins*	1.7	3	.57
Killingworth, Connecticut,	*Weatherby*, no. 3763	1.4	3	.37
Killingworth, Connecticut,	*Weatherby*, no. 2514	1.8	3	.60
Groton, Connecticut,	*Graves*, no. 256	1.5	2.7	.55
Groton, Connecticut,	*Woodward*	1.6	3	.53
Southington, Connecticut,	*Bissell*, no. 5529	1	2	.50
Long Branch, New Jersey,	*Wm. Boott*	2	3	.66
Burlington Co., New Jersey,	*Parker*	1.7	2.8	.60
Pine Barrens, New Jersey,	*A. Gray*	1.5	2.8	.53

	Typical P. LONGIFOLIUM	1st Glume.	Spikelet.	Proportion (per cent)
Cold Spring, New Jersey,	*Gershoy*, no. 52	1.2	2.4	.50
New Lisbon, New Jersey,	*MacElwee*	1.2	2.4	.50
Rehoboth, Delaware,	*Churchill*	1.5	2.5	.60
Talleyville, Delaware,	*Commons*	1.6	2.6	.58
Clinton, Maryland,	*Holm*	2	3	.66
Cape Henry, Virginia,	*Am. Gr. Nat. Herb.*, no. 50	1.8	2.8	.64
Sumter Co., Georgia,	*Harper*, no. 1081	2	3	.66
Gainesville, Florida,	*Am. Gr. Nat. Herb.*, no. 51	1.2	2	.60

Range of 1st Glume: 37–66 (av. 58) per cent. of length of Spikelet.

Var. TUSKETENSE

Kemptville, Nova Scotia,	*Fernald & Long*, no. 23,191	1.8	2.9	.63
Gilfilling L., Nova Scotia,	*Fernald & Long*, no. 23,190	2	3	.66
Butler's L., Nova Scotia,	*Fernald et al.*, no. 19,763	1.8	3.2	.56
Pearl L., Nova Scotia,	*Fernald & Linder*, no. 19,761	1.6	2.6	.58
Tusket R., Nova Scotia,	*Fernald et al.*, no. 19,765	1.7	3	.57
Tusket L., Nova Scotia,	*Fernald et al.*, no. 19,759	1.5	2.8	.53
Butler's L., Nova Scotia,	*Fernald et al.*, no. 19,764	1.8	3	.60

Range of 1st Glume: 53–66 (av. 60) per cent. of length of Spikelet.

Var. COMBSII

Coffee Co., Georgia,	*Harper*, no. 2014	2.1	3.5	.60
Berrien Co., Georgia,	*Harper*, no. 1679	2	2.8	.71
Chipley, Florida,	*Combs*, no. 583 (COTYPE)	2–2.2	3	.66–.73
Pensacola, Florida,	*Curtiss*, no. 6919	2.5	4	.63
Gateswood, Alabama,	*Tracy*, no. 8408	2.2	3.5	.63
New Orleans, Louisiana,		2	3.6	.55

Range of 1st Glume; 55–73 (av. 64) per cent. of length of Spikelet.

These measurements distinctly show the futility of attempting the separation of *Panicum Combsii* as a species distinct from *P. longifolium* because the former has the "Spikelets 3 to 3.5 mm. long; first glume two-thirds to three-fourths that length," while the latter has "Spikelets not over 2.7 mm., usually 2.5 mm. long, the first glume less than half that length." Of the comparatively few sheets seen of *P. Combsii*, 1 has the spikelets less than 3 (2.8) mm. long and only 2 have the glumes of the required length, the remaining sheets showing them well under two-thirds, and in one case only slightly more than one-half the length of the spikelets. All these sheets were labelled by Hitchcock & Chase *P. Combsii.*

In true *P. longifolium*, furthermore, it is a somewhat exceptional specimen which has the spikelets "not over 2.7 mm., usually 2.5 mm. long." Of the 23 measured (because well developed) 16 have spikelets longer, 2.8–3 mm., the latter measurement being most frequent. As to the length of the 1st glume, it is significant that in only a single

collection have I found the 1st glume "less than half" the length of the spikelet, while in several cases it reaches the reputed "two-thirds . . . that length" of *P. Combsii*. In the most northern extreme, *P. longifolium*, var. *tusketense*, furthermore, the spikelets stand midway in length between those of the very southern var. *Combsii* and of the geographically intermediate typical *P. longifolium*, while the glumes of the northernmost extreme average three-fifths as long as the spikelets.

Similarly with the reputed difference in the ligule. Harper's no. 1679 from Berrien County, Georgia, is cited (from Tifton) by Hitchcock & Chase as *P. Combsii* and the specimen in the Gray Herbarium so labelled by them has very orthodox glumes (71 per cent. the length of spikelet) but it is heterodox in having spikelets only 2.8 mm. long; and its ligules, which in *P. Combsii* should be "less than 1 mm. long," wholly break the bounds by measuring 3.5 mm. in length! On the contrary, in much northern material, for example *Graves*, no. 256, from Groton, Connecticut, cited as *P. longifolium* by Hitchcock & Chase, it is easy to find ligules not more than 1.5 mm. long.

Although breaking down as a species, *Panicum Combsii* may be maintained as a geographic variety. Its glumes and sterile lemma are more attenuate at tip than in the other varieties and its mature panicle, as shown by the cotype and other mature specimens, has more horizontal branches and branchlets than in true *P. longifolium* and var. *tusketense*. In its more divaricate branching var. *Combsii* simulates the coarser southern plant, var. *pubescens*. That variety, however, has relatively small spikelets, and its very long leaves, as beautifully exemplified in *Tracy*, no. 6507a, may greatly overtop the panicles.

PANICUM ANCEPS Michx., var. **rhizomatum** (Hitchc. & Chase), comb. nov. *P. rhizomatum* Hitchc. & Chase, Contr. U. S. Nat. Herb. XV. 109, fig. 104 (1910).

Only by those who recognize species which are confluent and which are separated solely on "more or less" difference in size and habit, without technical morphological characters, can *Panicum rhizomatum* be maintained as a species. Its leading diagnostic characters, as given by its authors, are found in their key:

Panicle open; spikelets 3.4 to 3.8 mm. long (shorter in exceptional specimens) ..... 55. *P. anceps.*
Panicle more or less contracted; spikelets not over 2.8 mm. long. 56. *P. rhizomatum.*

In their fuller discussion of *Panicum anceps* they note that the "open" panicle may be "occasionally narrower" or with "branchlets . . . approximate, producing densely flowered branches," while in *P. rhizomatum* "In occasional specimens the panicle is rather open but less so than in *P. anceps;* but the following three specimens, having all the characters of *P. rhizomatum*, have panicles as open as those of *P. anceps*, the small spikelets secund as in that species, and appear to be intermediates." There is sufficient evidence that they *are* intermediates. In spite of the spikelets of *P. anceps* being defined as "3.4 to 3.8 mm. long," there are "occasional specimens with smaller spikelets; . . . only 3 to 3.2 mm. long. Such . . . being nearly glabrous plants with open panicles, are referred here, though in the smaller spikelets they approach the next species [*P. rhizomatum*]."

If additional evidence were needed that *P. rhizomatum* is only a variation of *P. anceps*, it appears in sheets sent out from the National Herbarium to illustrate the two. The plant from Maryland, Amer. Gr. Nat. Herb. no. 54, distributed as *P. anceps*, "As described by Hitchcock & Chase," therefore conforming to their conception of the species, has the fully mature panicle of the same breadth but with slightly more ascending branches (less open panicle) than the mature panicle of their no. 56, distributed as an authentic representative of *P. rhizomatum*. In no. 54 the spikelets are only 3–3.2 mm. long, while the mature panicle of no. 56 displays some still persistent spikelets 3 mm. long. Again, compare *Curtiss*, no. 5747 and Biltmore Herb. no. 696^{b} from Florida. The former is cited in *The North American Species of Panicum* as good *P. rhizomatum* and from its freely developed rhizomes and small spikelets is a good illustration of that plant. The latter (696^{b}) is cited without question as *P. anceps* ("spikelets 3.4 to 3.8 mm. long"). Nevertheless, the very full sheet in the Gray Herbarium, bearing the Hitchcock & Chase revision label, looks like the other and its spikelets range from 3.2 down to 2.5 mm. in length.

PANICUM AGROSTOIDES Spreng., var. **condensum** (Nash), comb nov.
P. condensum Nash in Small, Fl. Se. U. S. 93, 1327 (1903).

Panicum condensum in its most extreme development is very different from the most ideal material of *P. agrostoides;* but, unfortunately, neither of them consistently stays close to the ideal. The beautifully clear key-characters published by Hitchcock & Chase would, if they held in a larger proportion of cases, be satisfactory. As stated by them the two differ as follows:

Spikelets 1.8 to 2 mm., in occasional specimens 2.2 mm. long; panicle branches ascending or spreading.....50. *P. agrostoides.*
Spikelets about 2.5 mm. long; panicle branches erect or nearly so. 51. *P. condensum.*

Turning to their fuller accounts, contradiction is promptly discovered: the spikelets of *P. condensum* are there described, not as "about 2.5 mm. long" (the key-character), but as "2.2 to 2.5 mm. long," *i. e.* as over-lapping in measurement. Furthermore, many specimens placed under *P. agrostoides* "have rather turgid spikelets 2 to 2.2 mm. long, more or less crowded on the ascending but not appressed branches and appear to be intermediate between *P. agrostoides* and *P. condensum.* These are not cited in the distribution given below."[1] Then follows an enumeration of such transitional plants from stations from the northeastern to the southeastern and the southwestern limits of the species; while in *P. condensum* "In occasional specimens . . . . the panicle branches are ascending, the panicle not contracted, thus approaching *P. agrostoides.*"

In the representation of the species in the Gray Herbarium 63 per cent. of the specimens are characteristic *P. agrostoides*, 10 per cent. thoroughly good *P. condensum;* but 27 per cent. are admitted intermediates. That is too large a proportion of transitional specimens. The specifications, if they are desired by any student, will be gladly furnished; their detailed enumeration here would make a discussion so similar to those under *P. anceps* and *P. longifolium* as to seem unnecessary.

P. LAXIFLORUM Lam., var. **strictirameum** (Hitch. & Chase), comb. nov. *P. xalapense strictirameum* Hitchc. & Chase, Contrib. U. S. Nat. Herb. xv. 161 (1910).

Although I am unable to find such definite trends as to keep *Panicum xalapense* HBK. (1816) apart from *P. laxiflorum* Lam. (1798), even as a variety or reasonably constant form, var. *strictirameum*, in its closer panicle of smaller and more rounded spikelets, is a striking departure from the commoner and wider-spread *P. laxiflorum.*

The characters used by Hitchcock & Chase to separate *P. xalapense* from *P. laxiflorum* are the following:

Blades ciliate and more or less pilose on the surface; spikelets 2 mm. long.....87. *P. xalapense.*
Blades glabrous or nearly so on the surface and margin; spikelets 2.2 mm. long.....86. *P. laxiflorum.*

[1] One cannot help calling to mind those trustful amateurs who, a generation ago, religiously cast into the waste-basket all specimens not conforming closely to "the books."

However, some cited specimens of the "glabrous" *P. laxiflorum* "have pilose blades like those of *P. xalapense;* the spikelets are 2.2 to 2.3 mm. long." Many of the specimens identified in the Gray Herbarium by Hitchcock & Chase and cited in their *North American Species of Panicum* as *P. xalapense* (presumably on account of a few trichomes or cilia on the foliage) have spikelets fully 2.2 mm. long and some of them actually 2.5–2.6 mm. long (larger than allowed for *P. laxiflorum*): *Biltmore Herb.*, no. 2993a; *Canby*, no. 106, "exceptional in having almost glabrous sheaths"; *Tracy*, no. 7202; *Curtiss*, no. 6602; etc. Conversely, numerous collections treated authoritatively as *P. laxiflorum* depart uncomfortably from the specifications: *Nash*, no. 239 (type-no. of *P. pyriforme* Nash), with spikelets 2.4–2.5 mm. long and some leaf-blades pilose nearly to the tip; *Churchill*, from South Jacksonville, April 11, 1897, with spikelets 2.5 mm. long but specially noted on the sheet by Mrs. Chase as "exceptionally pubescent"; *Tracy*, no. 7388, with spikelets as small as in the most theoretical *P. xalapense;* etc. The type of *P. xalapense*, with "spikelets 2 mm. long" (*H. & C.*) came from Mexico, and Hitchcock & Chase restrict *P. laxiflorum* with spikelets larger ("2.2 mm. long") to Georgia, Florida and Alabama. Nevertheless, *Pringle*, no. 13,250, from Hidalgo in Mexico, has the well developed spikelets 2.2–2.3 mm. long; and Hitchcock's collection from the type locality, Jalapa (Amer. Gr. Nat. Herb. no 84), shows some spikelets 2.2 mm. long.

Further discussion seems unnecessary.

P. MERIDIONALE Ashe, var. **albemarlense** (Ashe), comb. nov. *P. albemarlense* Ashe, Journ. Elisha Mitchell Soc. xvi. 84 (1900).

At best *P. albemarlense* seems to be only an extreme of *P. meridionale*. I have collected one or the other scores of times and am unable to find any morphological character to separate them; and it is significant that Hitchcock & Chase relied wholly on a habital tendency and on degree of pubescence:

Autumnal form widely decumbent-spreading, forming a mat; vernal culms soon geniculate-spreading; plants olivaceous. 122. *P. albemarlense.*

Autumnal form erect or leaning, never forming a mat; plants yellowish-green . . . . . 121. *P. meridionale.*

In the fuller discussion, however, they say of *P. albermarlense:* "Allied to *P. meridionale*, from which it differs mostly in the usually stouter, spreading culms, which often form large mats in the autumn, and in the softer, denser pubescence."

My own interpretation is that *P. columbianum thinium* Hitchc. & Chase, RHODORA, x. 64 (1908) is inseparable from *P. meridionale*. The habit is identical, and in all technical points they seem the same: "blades 1.5 to 4 cm. long, . . . long-pilose on the upper surface, . . . panicles 1.5 to 4 cm. long, nearly or quite as wide, ... spikelets 1.3 to 1.4 mm. long," etc. in *P. meridionale;* "blades rarely over 3 cm. long, sparsely pilose with long hairs on the upper surface . . . ; panicles 1.5 to 4 cm. long, about as wide; spikelets 1.3 to 1.4 mm. long" in *P. columbianum*, var. *thinium*. By definition there should be a difference in the length of ligules: in *P. columbianum* "ligules less than 1 mm. long," in *P. meridionale* "ligules 3 to 4 mm. long." Nevertheless, on the sheet in the Gray Herbarium specially sent out by Professor Hitchcock as typical *P. meridionale* (Amer. Gr. Nat. Herb. no. 122) it is difficult to find ligules as much as 1 mm. long.

P. LANUGINOSUM Ell., var. **fasciculatum** (Torr.), comb. nov. *P. dichotomum*, β. *fasciculatum* Torr. Fl. No. and Mid. U. S. 145 (1824). *P. nitidum*, α. *ciliatum and* δ. *pilosum* Torr. l. c. 146 (1824). *P. huachucae* Ashe, Journ. Elisha Mitchell Soc. xv. 51 (1898). *P. tenuissimum* Ashe, l. c. 52 (1898). *P. unciphyllum*, forma *prostratum* Scribn. & Merr. RHODORA, iii. 124 (1901). *P. lanuginosum*, var. *huachucae* (Ashe) Hitchc. RHODORA, viii. 208 (1906). *P. huachucae*, var. *silvicola* Hitchc. & Chase, RHODORA, x. 64 (1908). *P. languidum* Hitchc. & Chase, Contrib. U. S. Nat. Herb. xv. 232 (1910). *P. huachucae*, var. *fasciculatum* (Torr.) Hubbard, RHODORA, xiv. 171 (1912). *P. Lindheimeri*, var. *fasciculatum* (Torr.) Fern. RHODORA, xxiii. 228 (Jan. 26, 1922, the number dated "October," 1921).

P. LANUGINOSUM, var. **implicatum** (Scribn.), comb. nov. *P. implicatum* (Scribn.) U. S. Dept. Agric. Div. Agrost. Bull. 11: 43, fig. 2 (1898). *P. unciphyllum implicatum* (Scribn.) Scribn. & Merr. RHODORA, iii. 123 (1901). *P. Lindheimeri*, var. *implicatum* (Scribn.) Fern. RHODORA, xxiii. 228 (Jan., 1922, misdated Oct., 1921).

P. LANUGINOSUM, var. **Lindheimeri** (Nash), comb. nov. *P. Lindheimeri* Nash, Bull. Torr. Bot. Cl. xxiv. 196 (1897). *P. Lindheimeri*, var. *typicum* Fern. RHODORA, l. c. 227 (1922).

P. LANUGINOSUM, var. **septentrionale** (Fern.), comb. nov. *P. Lindheimeri*, var. *septentrionale* Fern. RHODORA, xxiii. 227 (Jan., 1922, misdated Oct., 1921).

When I reduced[1] to *Panicum Lindheimeri* many freely intergradient plants, I failed to go far enough. In its broad panicle with freely forking branches and long pedicels, in its obovoid, pubescent spikelets with characteristic short and broad 1st glume, in the shape

[1] See RHODORA, xxiii. 141 and 223–228 (1921, 1922).

of its foliage and in its autumnal branching *P. lanuginosum* Ell. Bot. S. C. and Ga. i. 123 (1816) seems too difficult to separate *specifically* from the many plants enumerated in the preceding synonymy. The only strong tendency which separates it from them is the often denser and shorter pubescence. This, in the main, is good, but the leaf-margins often have the papillose-ciliate character of the others and the upper surfaces have a few of the long trichomes which characterize some of the other variants. Without morphological characters of the spikelets or inflorescence, but distinguished only on its usually denser pubescence, *P. lanuginosum* seems hardly separable *specifically* from the others.

Ashe, who was not averse to recognizing any variant as a "species," could not clearly distinguish *P. lanuginosum* and *P. huachucae* (see Hitchc. & Chase, p. 221). Hitchcock, in 1906, treated the two as conspecific; and Scribner & Merrill, in 1901, merging *P. implicatum* with the plants which have been separated as *P. huachucae*, but, unfortunately, under the confused name *P. unciphyllum* Trin., put *P. tennesseense* into *P. lanuginosum* and correctly said: "*Panicum lanuginosum* is extremely variable and often can only be separated arbitrarily from the related species—it is possible that it should be considered only as a variety of the preceding species." According to Hitchcock & Chase, in *P. lanuginosum* "The vernal form . . . . resembles *P. huachucae silvicola* but is larger and more velvety"; but, curiously, although *P. lanuginosum* is sharply separated in their key in *The North American Species of Panicum* by being "velvety-pubescent," while *P. tennesseense*, *implicatum*, *languidum*, *huachucae*, etc. are merely "pubescent, often villous, but not velvety," *P. ciliosum* Nash, referred definitely by them to the synonymy of the "velvety" *P. lanuginosum*, "differs in having blades glabrous on the upper surface or with a few long hairs only, but not velvety," and numerous other specimens, "because of the lack of velvety pubescence on the upper surface of the blades, may be referred to this form" (H. & C., p. 221).

The instability of the other members of this aggregate-species was sufficiently elucidated in Rhodora, xxiii. 141 and 223–228 (1921, 1922). More than a decade of later experience has strengthened the conviction that they are not specifically separable. *P. lanuginosum* Ell. (1816) is, apparently, the oldest specific name for this particularly involved group.

P. VILLOSISSIMUM Nash, var. **pseudopubescens** (Nash), comb. nov. *P. pseudopubescens* Nash, Bull. Torr. Bot. Cl. xxvi. 577 (1899).

P. VILLOSISSIMUM, var. **scoparioides** (Ashe), comb. nov. *P. scoparioides* Ashe, Journ. Elisha Mitchell Soc. xv. 53 (1898).

It is most difficult to find any constant character of the inflorescence to separate *P. pseudopubescens* and *P. scoparioides* from *P. villosissimum*. The subappressed pubescence of the former sets off a large series of specimens and these may appropriately stand as a variety. Although maintaining *P. pseudopubescens* as a species, Hitchcock & Chase do not give very emphatic distinctions:

> Vernal form similar to that of *P. villosissimum;* . . . pubescence [of spikelets] as in *P. villosissimum;* winter leaves as in *P. villosissimum.*
> This species is very closely allied to *P. villosissimum* and occasional specimens are about as close to one type as to the other.

Numerous specimens corroborate this opinion.

As to *P. scoparioides*, it seems to differ chiefly in its smoother quality, with sparser and shorter trichomes and in a tendency to have less exserted primary panicles. It is also very localized and scattered in occurrence; and it is possible that it is not a well established type, but rather a series of sporadic colonies resulting from the crossing of one of the glabrous species with small and pubescent spikelets, like *P. lanuginosum* Ell., var. *septentrionale* Fern., with the slightly coarser *P. oligosanthes* Schultes, var. *Scribnerianum* (Nash) Fern. The very few collections at hand look like the result of such a hypothetical cross.

P. COLUMBIANUM Scribn., var. **oricola** (Hitchc. & Chase), comb. nov. *P. oricola* Hitchc. & Chase, RHODORA, viii. 208 (1906).

Panicum oricola, as a coastwise variety of the wider-ranging *P. columbianum* (including *P. tsugetorum* Nash), seems to stand to that species in the same relation as *P. albemarlense* to *P. meridionale:* a more depressed and more pubescent extreme of the open sands, without significant difference in spikelet. I get no mental satisfaction from striving to keep *P. tsugetorum* apart from *P. columbianum*. In the 7th edition of Gray's Manual Hitchcock defined the almost indefinable difference: in the former "*spikelets* 1.9 *mm. long*," "*blades* 5–6 *cm. long*"; in the latter "*spikelets* 1.7 *mm. long*," "*blades* 5 *cm. long or less.*" In *The North American Species of Panicum*, however, *P. tsugetorum* is given "spikelets 1.8 to 1.9 mm. long" and "blades 4 to 7 cm. long," while these critical measurements in *P. columbianum* appear as "1.5 to 1.6 mm." and "3 to 6 cm." respectively. Further clinching

their essential identity, Mrs. Chase collects and distributes, to stand as authentic *P. columbianum* with "spikelets 1.5 to 1.6 mm. long," material (Am. Gr. Nat. Herb. no. 148) with many spikelets well over 1.6 mm. in length.

P. LANCEARIUM Trin., var. **patulum** (Scribn. & Merr.), comb. nov. *P. Nashianum patulum* Scribn. & Merr. U. S. Dept. Agric. Div. Agrost. Circ. no. 27: 9 (Dec. 4, 1900). *P. patulum* (Scribn. & Merr.) Hitchc. RHODORA, viii. 209 (1906).

Var. *patulum* was originally considered by Scribner & Merrill a variety of *P. Nashianum* Scribn. (1897), a species which Hitchcock & Chase identify with *P. lanceariun* Trin. (1826). The evaluation of *P. patulum* by Scribner & Merrill seems to have been thoroughly justified: "This variety is closely related to the species, intermediate forms occurring." Hitchcock & Chase maintain *P. patulum* as a distinct species on what seem like minor ecological characters:

Blades firm, glabrous above; culms stiffly ascending..164. *P. lanceariun.*
Blades lax, softly puberulent on both surfaces; culms decumbent.
165. *P. patulum.*

Nevertheless, they assign the culms of the "stiffly ascending" *P. lanceariun* "a more or less geniculate base," while in the description the leaves become "usually glabrous on the upper surface" and the autumnal culms are "geniculate-spreading." "The following [7] specimens approach *P. patulum* in habit or in having papillose, more rounded spikelets, but the blades are not pubescent on the upper surface, or but one or two are pubescent"; while in the "readily distinguished" *P. patulum* "the blades are sometimes only obscurely pubescent above." Of the specimens of the two in the Gray Herbarium fully one-fourth are transgressors.

P. OLIGOSANTHES Schultes, var. **Scribnerianum** (Nash), comb. nov. *P. Scribnerianum* Nash, Bull. Torr. Bot. Cl. xxii. 421 (1895).

P. OLIGOSANTHES, var. **Helleri** (Nash), comb. nov. *P. Helleri* Nash, Bull. Torr. Bot. Cl. xxvi. 572 (1899).

Typical *Panicum oligosanthes* Schultes (1824), as interpreted by Hitchcock & Chase, is the plant of the southeastern Coastal Plain (but extending in the interior northward to Lake Michigan) with linear-lanceolate primary leaves mostly under 8 mm. broad and spikelets commonly 3.5–4 mm. long. Northward and westward it is represented by a plant of quite similar character (*P. Scribnerianum*) but with the primary leaves usually more lanceolate and slightly broader (up to 12 mm.) and the spikelets slightly shorter (usually under

3.5 mm. long); and southwestward the two pass by insensible transitions into *P. Helleri* which is commonly glabrous or appressed-pubescent, as in *P. oligosanthes*, thinner-leaved than in most material of the others, and with spikelets as small as in *P. Scribnerianum*.

That *P. oligosanthes*, *P. Scribnerianum* and *P. Helleri* are not truly segregated species, in the sense used by most conservative taxonomists (such indubitable species, for instance, as *P. verrucosum* Muhl., *P. depauperatum* Muhl., *P. microcarpon* Muhl., *P. dichotomum* L. (including *P. barbulatum* Michx.), *P. lucidum* Ashe, *P. xanthophysum* Gray, etc.) is made sufficiently clear by the very illuminating critical comments of Hitchcock & Chase regarding them. Their key does not sharply contrast the first with the other two, for that is separated from them and from *P. Wilcoxianum* (from which I am unable to distinguish *P. Deamii* Hitchc. & Chase in Deam, Grasses of Indiana, 283, 284, t. 75 and fig. 18) on evasive shape of spikelets, shade of green of the plants and direction of trichomes.

Spikelets narrowly obovate, subacute; plants olivaceous, appressed-pubescent.....172. *P. oligosanthes.*
Spikelets broadly obovate, turgid, blunt; plants green, pubescence, if present, not appressed.
Blades [etc.].....168. *P. wilcoxianum.*
Blades ascending or spreading, rarely less than 8 mm. wide, usually wider; plants not hirsute throughout.
Spikelets 3.2 to 3.3 mm. long; blades firm; sheaths or some of them more or less hispid.....171. *P. scribnerianum.*
Spikelets not over 3 mm. long; blades rather thin; sheaths or some of them glabrous or sparsely hispid.
170. *P. helleri.*

The key itself, when carefully checked, is sufficient indication that the quality ascribed to the blades of *P. Helleri* extends to the whole series of differential characters. Starting with the spikelets, the "narrowly obovate [*i. e.* obovoid], subacute" spikelet of the type of *P. oligosanthes* is illustrated by Hitchcock & Chase as their fig. 321; the "broadly obovate [obovoid], turgid, blunt" spikelet of the type of *P. Helleri* in their fig. 317. The very close similarity of outline of spikelets in figs. 317 and 321 is doubtless due to the facts that the autumnal state of *P. oligosanthes* has "spikelets . . . . commonly more turgid and blunt"; that some specimens of *P. oligosanthes* "appear to be intermediate between this and *P. scribnerianum*, having the narrow blades, appressed pubescence, and open, few-flowered panicles of *P. oligosanthes*, but very turgid, blunt spikelets, which, however, measure 3.5 to 3.7 mm. long"; and that in some

specimens of *P. Helleri* "The spikelets are 3 mm. long, too immature to show turgidity."

As to length of spikelets, the very definite statements in key and diagnoses need emendation. *P. oligosanthes* by the diagnosis has "spikelets 3.5 to 4 mm. long," but "In this species the spikelets vary more in size than usual in this group. The following specimens have spikelets only 3.2 to 3.3 mm. long." This is the exact size given in the key and the diagnosis for *P. Scribnerianum;* but in "A few Mississippi specimens" of the latter Hitchcock & Chase find "spikelets 3.2 to 3.6 mm. long." Spikelets 3.6 mm. long are the rule at the northeastern limit of the species, in southwestern Maine and southern New Hampshire (South Berwick, Me., *Parlin & Fernald;* York, Me., *Fernald & Long*, no. 12,547; Walpole, N. H., *Fernald*, no. 280); and upon such material from Massachusetts the range of reputedly true *P. oligosanthes* has been extended to the northeastern limit of *P. Scribnerianum* (see Hubbard, Rhodora, xv. 64). Furthermore, although *P. Helleri* has the "Spikelets not over 3 mm. long," in "a few specimens . . . . the spikelets are 3.1 to 3.2 mm. long; and *Hitchcock* 1233, with spikelets 3.3 mm. long, is referred here since the specimen shows the sprawling habit of *P. helleri.*" *P. oligosanthes*, which, as above shown, may, likewise, have the "spikelets only 3.2 to 3.3 mm. long," has the autumnal state "erect or spreading, sometimes topheavy-prostrate." The specific differentiation now seems to hang on the distinction between "sprawling" and "topheavy-prostrate." I give up!

As for the difference between "olivaceous" and "green," again I give up. The New England plant (*P. Scribnerianum*) is surely not a deep green, but rather pale. In the garden the depth of green in many plants is much altered by the increase or diminution of nitrates; *P. oligosanthes* and other species (*P. xanthophysum*, for instance) growing in open sterile sands and gravels are far less green than when they occur in richer soils. Unless supported by morphological characters, such differences in depth of green are not specific.

In the "appressed-pubescent" *P. oligosanthes* the diagnosis calls for "the papillose pubescence ascending," but in many of the specimens it diverges at an angle of 60°, while in some it is almost horizontally spreading. In *P. Helleri* with "sheaths or some of them glabrous or sparsely hispid," as opposed to *P. Scribnerianum* with "some of them more or less hispid," "little weight can be given to pubescence or lack

of it"; while *P. Scribnerianum* "is very variable in the matter of pubescence. . . . Glabrous and hispid sheaths are commonly found on the same specimen."

Ordinarily *P. oligosanthes* and *P. Scribnerianum*, growing in open sandy or rocky soil, have the firm leaves of ordinary xerophytic colonies of plants, while some of the woodland specimens of *P. Helleri* have them thinnish. Specimens of the latter species, however, such as *Bush*, no. 3893, *Hitchcock*, no. 1173, *Reverchon*, no. 2854 and *Bush*, no. 5399, growing in the open, have firm enough foliage; and in tracing *P. Scribnerianum* to its nomenclatural source (*P. scoparium* of Gray, Man. 613, not Ell.) Hitchcock & Chase designated "as the type of *P. scribnerianum*" a plant from Pennsylvania collected by John Carey in 1836. The type of *P. Scribnerianum* has leaves as thin as in the most extreme *P. Helleri*.

It is quite unnecessary to amplify by further illustrations from abundant intergradient specimens the clear demonstration supplied by the critical comments of Hitchcock & Chase, that *P. Scribnerianum* and *P. Helleri* are not specifically separable from *P. oligosanthes*. By treating them as "species" on a par with innumerable true and constant species one of the simplest and most fundamental principles of evolution and of sound taxonomy is obscured.

P. COMMUTATUM Schultes, var. **Ashei** (Pearson), comb. nov. *P. Ashei* Pearson in Ashe, Journ. Elisha Mitchell Soc. xv. 35 (1898), excluding synonym.

In their extremes *P. commutatum* and *P. Ashei* appear very different: such extremes, for instance, as the narrow-leaved stiff *P. Ashei* with wiry, slender culms grayish-puberulent, which abounds in southern New England, New York and New Jersey, appearing utterly unlike the coarser, large-leaved, glabrous plant of Florida and other southern states, true *P. commutatum*. Similarly, the firm-leaved and erect *P. commutatum* of open habitats, with comparatively pale foliage, looks, at first glance, amazingly unlike the weak and often depressed or reclining, thin- and dark-green-leaved plant of southern swamps and wet woods, which has been separated as *P. Joorii* Vasey, U. S. Dept. Agr. Div. Bot. Bull. 8: 31 (1889); but prolonged study of the plants referred by Hitchcock & Chase to these three categories and close checking of the variability of the characters emphasized by them and shown by abundant specimens fail to reveal the clear lines which we have learned, through years of experience, to look for in

true species. *P. Joorii* seems like *P. commutatum* venturing from the open sands and dry open woods into the rich southern swamps or wet woods and there displaying the simple edaphic responses which one would expect in such a habitat: deeper-green, thinner and more spreading leaves and weaker habit. I am unable to find in the material that striking asymmetry of leaf which is so emphasized by Hitchcock & Chase as to become one of their key-characters. A very slight asymmetry sometimes occurs but similar asymmetrical foliage can easily be found on sheets of *P. commutatum* from the drier open habitats and of *P. Ashei*. To me *P. Joorii* is a weak and thin-leaved state of *P. commutatum;* and *P. Ashei* is a well defined but by no means constant variety which ranges generally more to the north than does true *P. commutatum*. In the latter decision I find myself heartily in accord with the conclusion of Scribner & Merrill in their very sound and satisfying study of *The New England Species of the Genus Panicum*[1] published in 1901, though I would unhesitatingly admit *P. Ashei* as a good geographic variety. Scribner & Merrill reduced outright *P. Ashei* to *P. commutatum*, but they qualified the reduction by the note: "In the type [true *P. commutatum*] the culms are glabrous as are the nodes, but in the form which extends into New England ranging southward to Tennessee and Florida the culms, at least the lower internodes, are puberulent and the nodes often quite densely pubescent with erect, appressed hairs."[2] On characteristic New England sheets of *P. Ashei* they recorded, at that time, their conviction as follows: "*Panicum Ashei* Pearson, a form or var. of *P. commutatum* Schultes."

Turning to the extended treatment by Hitchcock & Chase we find the most significant differences, as recognized by them, in the key:

Culms crisp-puberulent; blades usually rigid, symmetrical, rarely over 10 mm. wide; spikelets about 2.5 mm. long.....183. *P. ashei.*
Culms glabrous or softly puberulent; blades firm or lax; spikelets 2.7–3.2 mm. long.
  Culms erect, or autumnal form leaning; blades symmetrical, broadly cordate.....184. *P. commutatum.*
  Culms decumbent; blades usually asymmetrical and falcate, narrowed to the scarcely cordate base.....186. *P. joorii.*

Turning to the fuller discussions by Hitchcock & Chase we find their key-characters modified. The spikelets of *P. Ashei* become "2.4–2.7 mm. long," though in "Occasional specimens . . . . only 2.1–2.3 mm. long"; and the type has the leaves "less rigid than usual."

[1] Scrib. & Merr., Rhodora, iii. 93–129 (1901).
[2] Scrib. & Merr. l. c. 116, 117 (1901).

The term *rigid* is pretty strong for a leaf which is easily bent by merely poking it against a neighboring object; and when the New England plant grows in the shade its leaves are thin and submembranaceous.

In the full description of *P. commutatum* the spikelets are defined as "2.6–2.8 mm. long," not very much larger than the "2.4–2.7" of *P. Ashei;* but "Most of the Florida specimens . . . . have . . . . spikelets 3 to 3.2 mm. long. This form can not be satisfactorily separated even as a subspecies, though extreme specimens differ sufficiently to be recognizable." In *P. Joorii* the spikelets are described as "3 to 3.1 mm. long," which should keep it apart from *P. Ashei*, but, unfortunately, there are some "doubtful" "specimens with spikelets only 2.2 to 2.5 mm. long."

As to the culms, *P. commutatum* "is typically almost glabrous, . . . but puberulence occurs rather commonly and is not found to be associated with any other character. . . . Some puberulent specimens have ordinarily wide blades and other specimens with wide blades are glabrous." Similarly with *P. Joorii:* "As a whole this species has glabrous culms, sheaths and blades, but occasional specimens more or less puberulent are found."

Although the leaf-blade of *P. commutatum* is said in the key to be symmetrical as opposed to the "usually unsymmetrical" blade of *P. Joorii*, it seems that in *P. commutatum* the "Early autumnal specimens . . . sometimes appear very different from vernal specimens, owing to the somewhat unsymmetrical broadening of the middle of the crowded upper blades."

Furthermore, "A few southwestern specimens . . . differ in appearance from *P. commutatum* . . . . and seem to approach *P. joorii*, but the spikelets are not over 2.8 mm. long." In *P. Joorii*, nevertheless, as pointed out in a preceding quotation, they may be as short as 2.2 and as long as 3.1 mm.

Although Hitchcock & Chase find *Panicum Ashei* an "unusually uniform species," it should be apparent from the contradictory statements above quoted that it belongs to that large group of so-called "species," very much favored by some of our American botanists, in which stability of characters is not required: the geographically somewhat segregated tendencies which I believe in calling geographic varieties.

On July 23, 1895, the late Thomas C. Porter collected at Chestnut

Hill, Easton, Pennsylvania, the freely branching late-summer or autumnal state of a plant which he called *P. commutatum;* the next June, on the 5th, he collected the same plant at Chestnut Hill in the vernal state, with simple culms and well developed terminal panicles. The two collections look as if they were from the identical colony; both have ashy-puberulent culms and submembranaceous leaves mostly 1–1.5 cm. wide, the larger of the primary ones 57–63-nerved. The collection of July 23 (in the Gray Herbarium) is labelled by Hitchcock & Chase as unquestioned *P. Ashei;* the material of it in the vernal stage (June 5) as *P. commutatum.* The plants, to be sure, are embarrassing, for they have the puberulence of *P. Ashei,* with the leaves overstepping the prescribed limit of 10 mm. They belong in the *intermediate* group, a status likewise shown by the number of veins in the larger leaves. I have been over the better-marked plants of *P. commutatum* of the South and the clearly defined *P. Ashei* of the North and find that in the larger leaves of the former the nerves count up to 53–99, while in *P. Ashei* they range from 31–61. The Chestnut Hill material, which is authoritatively placed in both species, shows a count of nerves too near the border-line. Another Pennsylvania sheet, *Heller,* no. 4780, collected in Lancaster County, June 5, 1901, is cited in the *North American Species of Panicum* as perfectly good *P. Ashei.* Nevertheless, the specimens of this no. in the Gray Herbarium, specially renamed by Hitchcock & Chase *P. Ashei* (probably because of puberulence on the lower internodes), show plenty of leaves 1.8–2 cm. broad.

If there is any clearly recognizable difference between the kinds of puberulence emphasized by Hitchcock & Chase ("Culms crisp-puberulent" in *P. Ashei;* "glabrous or softly puberulent" in *P. commutatum*) the soft puberulence or short pilosity is well displayed in ***Bush***, no. 410, from McDonald Co., Missouri. The leaves of this no. (as represented in the Gray Herbarium) are 7–11 mm. wide; consequently it was relabelled "*P. Ashei.*" But the "softly puberulent" lower internodes and the 75 nerves of the leaves remove it technically from that "species" as defined.

It is unnecessary to multiply cases of the break-down of characters: there are before me a score or more of other examples and they include quite inseparable collections called sometimes *P. commutatum,* sometimes *P. Joorii:* for instance *Harper,* no. 1623, from Brooks Co., Georgia and *Nash,* no. 1675, from Lake Co., Florida, both cited as *P.*

commutatum; while *Hitchcock*, no. 477, from Alva, Florida and looking as if unretrievable if it became mixed with the other two, is cited as *P. Joorii*. Both identifications seem correct and they reemphasize the lack of specific differences between *P. Joorii* and *P. commutatum*.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.

CIV.

ISSUED AUG 6 - 1934

I. Records preliminary to a general treatment of the Eupatorieae,—XI. By B. L. Robinson 3
II. The Variability of two wide-ranging Species of Mikania. By B. L. Robinson 49
III. Mikania scandens and its near Relatives. By B. L. Robinson 55
IV. Studies in the Bromeliaceae,—V. By Lyman B. Smith . . 71

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I. RECORDS PRELIMINARY TO A GENERAL TREATMENT OF THE EUPATORIEAE—XI.

B. L. Robinson.

BV # 46125

Since the preparation of the preceding paper in this series, published in August 1932, the writer has received for examination and identification additional material of the *Compositae-Eupatorieae* from many sources. Grateful to all who have thus aided his monographic studies, he would here mention his special indebtedness to those in charge of the herbaria of the Royal Botanic Gardens at Kew, the Botanical Section of the National Museum at Stockholm, the Botanical Conservatory of Geneva, the Botanical Museums at Berlin-Dahlem and at Munich-Nymphenburg, the New York Botanical Garden, the United States National Museum, the Field Museum, the Missouri Botanical Garden and the Botanical Departments of the Universities of California, of Michigan and of Minnesota. All of these establishments have lent unidentified specimens from the less known regions in the American tropics and several have most kindly permitted the borrowing even of type-material, when this has been particularly needed. Exceedingly helpful has been a loan of the *Eupatorieae* from the admirable private herbarium of Mr. Cornelius Osten of Montevideo.

It has likewise been a much appreciated privilege to work over the *Eupatorieae* of several recent exploring expeditions, notably those of Messrs. E. P. Killip and A. C. Smith in Peru, of Mrs. Ynes Mexia, both in Minas Geraes, Brazil, and along the Marañon River in Peru, of Mrs. Agnes Chase in Brazil, of Dr. A. F. Skutch in Guatemala, of Professor H. H. Bartlett and his assistants in Central America and of Professor R. H. Wetmore and Dr. E. C. Abbe in the Canal Zone.

Highly interesting material has also been from time to time submitted by Dr. F. C. Hoehne of the Biological Institute of São Paulo, Brazil, by the Rev. Father Luis Mille of Guayaquil, Ecuador, by Dr. Otto Buchtien of La Paz, Bolivia, by Dr. Lorenzo R. Parodi, professor at the Universities of Buenos Ayres and of La Plata, by Professor Martin Cárdenas of Potosi, Bolivia, from Dr. Angel Cabrera of the Museum of the University of La Plata, by Mr. Pedro Jörgensen of Villarica, Paraguay, by Mr. Arturo Burkart of Buenos Ayres and by Mr. Teodora Meyer of Fontana in the Argentine Province of Chaco.

Material from these sources and some others, such as collections acquired by purchase and a few hitherto unworked remainders of earlier loans, has yielded many plants new to science as well as newly observed

facts concerning habit, diagnostic features, range and variability within the group. These, so far as feasible, are put on record in the present paper.

Piqueria Standleyi, spec. nov., fruticosa gracilis usque ad 2 m. alta primo adspectu glabra sed obscure subadpresseque puberula; ramis subteretibus curvato-adscendentibus aetate pallide griseis ca. 2 mm. diametro; internodiis usque ad 1 dm. longis; foliis oppositis graciliter petiolatis ovatis caudato-acuminatis subintegris vel inaequaliter crenato-dentatis et aliquando plus minusve lateraliter uniangulatis utrinque viridibus textura membranaceis ima a basi 3-nervatis supra glabriusculis subtus praecipue in nervis obscure puberulis plerisque 6–8 cm. longis et 3–5 cm. latis; petiolo 1.5–3 cm. longo; thyrso terminali parvo subdenso; capitulis 3–5-floris brevissime pedicellatis ca. 4.5 mm. longis; involucri squamis ca. 4 linear-lanceolatis peracutis viridibus dorso incurvo-puberulis et cum glandulis sessilibus ornatis; styli ramis longis ad apicem versus incrassatis; achaeniis ca. 2 mm. longis minute puberulis; pappo nullo.—SALVADOR: Sierra de Apaneca, in region of Finca Colima, Dept. Ahuachapán, Jan. 17–19, 1922, *Paul C. Standley*, no. 20,076 (TYPE, in U. S. Nat. Herb., phot. and small fragm. Gr.).

Having anthers apically unappendaged and achenes destitute of pappus, this plant, with somewhat the habit of an erect *Mikania*, seems definitely to fall into the genus *Piqueria*, where it will certainly be easily distinguished by its triangular-ovate leaves, narrow and very acute phyllaries, as well as its rather compact inflorescence from any of the other species as yet known to occur north of Panama. Persistent efforts to place it satisfactorily in any of the South American species have been wholly unsuccessful.

AGERATUM GAUMERI Robinson, Proc. Am. Acad. xlix. 463 (1913). This species, clearly referable to § *Euageratum*, normally has five pappus-scales, some being rather short and muticous, others attenuate to a bristle tip and nearly equalling the corolla-tube. However, among some *Compositae* collected by Mr. W. C. Steere on his expedition to Yucatan, under the joint auspices of the Carnegie Institution, the University of Michigan and the U. S. Department of Agriculture, there has been found a plant which has calvous achenes but in other respects closely agrees with the type. This may be put on record as follows:

Forma **fallax**, forma nova, quoque formae typicae aliter omnino similis differt achaenis calvis.—YUCATAN: Muna, on rocks on a high

ridge, 22–23 July, 1932, *W. C. Steere*, no. 2125 (Gr.); San Miguel, Cozumel Island, Quintana Roo, in low forest, *W. C. Steere*, no. 2643 (Gr.).

Similar pappusless forms of normally pappus-bearing species occur in some other species of the genus as well as elsewhere in the *Compositae*.

Ageratum panamense, nom. nov. *A. rivale* Robinson, Contrib. Gray Herb. lxi. 3 (1920), not Sessé & Mociño, La Naturaleza, ser. 2, 1. app. 136 (1889). This earlier Mexican homonym, which was not included in the bibliographical indices of its period, unfortunately escaped the writer's notice when the Panama plant was being named. The identity of Sessé & Mociño's *A. rivale*, published (as *A. Riuale*) long after the death of its authors, has not been determined. The plant is stated to have been an erect annual, about a foot in height, with alternate multipartite linear-lobed leaves, a single terminal peduncle, 6 obovate-oblong phyllaries and as many 4-fid corollas. It is clear that this problematic old species could not have been an *Ageratum*. However, the International Rules of Botanical Nomenclature no longer permit the use of a later homonym and it therefore becomes necessary to rename the plant of Panama.

Stevia (§ Breviaristatae) anisostemma Turcz. Bull. Soc. Imp. Nat. Mosc. xxiv. pt. 1, 167 (1851). The original material of this species has phyllaries dorsally beset with short-stiped glands. It is a native of the Quitesian Andes and sometimes attains a height of 5–7 dm., having thickish leaves of rather firm texture and 3–4 cm. in length. This may be styled var. **typica**. A plant of similar decumbent habit and identical floral and achenial characters but of lower growth, smaller thinner leaves and eglandular phyllaries may be put on record thus:

Var.? **Wagneri**, var. nov., humilior 12–16 cm. alta; foliis rhombeis 1.5–2 cm. longis textura membranaceis; involucri squamis laxe puberulis, pilis albidis tenuibus patentibus vel crispis non glanduliferis.—Ecuador: in the western Andes, on trachyte, clay-slates and old sandstone of the Serra Encillada in the southerly vicinity of Mt. Chimborazo, alt. 2745–3050 m., Sept. 1858, *Dr. Moritz Wagner* (type, in herb. Univ. Munich, phot. and small fragm. Gr.); also a second specimen of the same date and collector from Guaranda Valley, likewise in the southern neighborhood of Mt. Chimborazo, on pumice and trachyte, alt. 2300–2700 m.

S. aristata D. Don, var. villaricensis Robinson, Contrib. Gray Herb. xc. 8 (1930). Under this name was published a plant collected by Jörgensen March 2, 1929 and distributed under his no. 4267.

In the United States National Herbarium a second specimen has been found of Jörgensen's no. 4267 collected March 1931. This unfortunately, though bearing the same number, is the typical *S. aristata* and not the smaller-leaved glandular variety published as var. *villaricensis* and should not be taken as an isotype of the latter. The issue under identical numbers of plants collected at different dates or places is a practice to be avoided, since in many cases it results in this kind of confusion.

S. Batesii, spec. nov., herbacea perennis erecta 2–3 dm. vel ultra altitudine; caule tereti crispe puberulo superne ramoso; ramis alternis patenter adscendentibus foliosis; foliis alternis sessilibus oblongis integerrimis vel obscure ad apicem acutum versus paullo undulato-dentatis obscure 3-nervatis basi cuneatis supra viridibus (post exsiccationem nigrescentibus) brevissime hirtellis subtus molliter griseo-tomentosis plerisque 2–3 cm. longis et 5–8 mm. latis tenuibus; panicula planiuscula foliosissima; pedicellis 1–9 mm. longis; capitulis ca. 8 mm. longis ad apices ramulorum in racemulas falsas dispositis; involucri squamis lanceolatis acutis dorso crispe puberulis et cum glandulis sessilibus munitis; corollis pubentibus et glandulis sessilibus ornatis ut videtur albis; tubo proprio gracili ca. 1.5 mm. longo; faucibus cylindratis ca. 2.5 mm. altis; dentibus limbi 5 patentibus ovatis obtusis; achaeniis heteromorphis 3.5 mm. longis in angulis hispidulo-scabratis, eorum tribus (adelphocarpiis) 3-aristatis et coronula squamularum munitis, duobus alteris (idiocarpiis) exaristatis sed etiam coronulatis.—Mexico without locality, 1846, *Bates*, no. 25 (type, in herb. Royal Gardens, Kew, phot. and small fragm. Gr.).

This plant has been repeatedly studied in the hope of placing it among the already described members of its perplexing genus, but quite without success. Its alternate sessile non proliferous leaves closely covered beneath by a gray tomentum and its rather loose and very leafy inflorescence give the plant individuality and should lead to its pretty ready recognition. It is manifestly related to, though certainly distinct from, *S. ovata* Willd.

S. Benderi Perkins in Engl. Bot. Jahrb. xlix. 221 (1913); Robinson, Contrib. Gray Herb. c. 54 (1932). Of this little known species a second tendency is now evident from material kindly communicated by Prof. M. Cárdenas of Potosi, Bolivia. It may be distinguished from the typical form by the following traits:

Var. α. **typica** glanduloso-puberula; involucro extus dense pilis brevissimis glandulari-capitatis rectis patentibus obtecto; corollis praecipue in tubo et in faucibus glandulari-puberulis; achaeniis dense in faciebus brevissime puberulis et in angulis scabratis.—

Bolivia: Dept. Potosi: Quechisla, *Bender*, no. 24 (Brl., phot. and sketches of details, Gr.); *Cárdenas*, no. 29 in part (Gr.).

Var. β. **Cardenasii**, var. nov., brevissime pilis incurvis non glandiferis puberula; involucro extus pilis incurvis albis attenuatis eglandulosis ornato; corollis parce hispido-hirtellis eglandulosis; achaeniis in angulis scabratis sed in faciebus laeviusculis.—Bolivia: Dept. Potosi: near Betanzos, alt. 3800 m., *Cárdenas*, nos. 479 (Gr.) and 480 (type, Gr.).

S. (§ **Multiaristatae**) **dubia**, spec. nov., herbacea perennis erecta submetralis laxe pilosa; radice e fibris longis duris nigrescentibus sistente; caule tereti purpurascenti usque ad 5 mm. diametro folioso supra mediam partem adscendenter ramoso; internodiis 3–5 cm. longis; foliis plerisque ternatis breviter petiolatis rhombeo-ovatis subobtusis grosse inciso-crenatis ad basin versus integris cuneatis supra laxe pilosis subtus in superficie sparse et secum nervos dense patenter pilosis textura membranaceis paullo discoloribus plerisque 4–5 cm. longis 2–2.4 cm. latis; pilis albis attenuatis moniliformibus; petiolo ca. 4 mm. longo; panicula terminali valde convexa; capitulis ca. 12 mm. longis sessilibus glomeratis; bracteis ovatis integris; bracteolis ovalibus apice rotundatis involucro 2–3-plo brevioribus; involucri squamis viridibus lanceolato-oblongis vel -linearibus dorso margineque hirtis et cum glandulis brevissime stipitatis ornatis ca. 6 mm. longis; corollis roseis; tubo proprio 1.5 mm. longo hirto; faucibus subcylindratis ca. 3.5 mm. longis; dentibus limbi anguste oblongis 1.8 mm. longis 0.7 mm. latis; achaeniis heteromorphis ca. 5 mm. longis, eorum 3 (adelphocarpiis) 11–12-aristatis, ceteris (idiocarpiis) 0–6-aristatis; aristis ca. 4.5 cm. longis.—Brazil: Serra dos Orgãos, Rio de Janeiro, *Glaziou*, no. 6575 (K., phot. & sm. fragm. Gr.).

Determined by Baker as *S. organensis* Gardn. and so reported by Glaziou, Mém. Soc. Bot. Fr., iii. 383 (1909), but differing from that species in several important respects, particularly in its sessile heads, more numerous awns and distinctly, though shortly petiolate, ternate leaves.

The little known *S. verticillata* Schlecht. Linnaea, xvi. 372 (1842), which has many points in common, is said to have broadly lanceolate leaves (the largest nearly 3 inches in length), 6–9-awned achenes and heads on pedicels nearly equalling or even exceeding the involucre.

S. (§ **Multiaristatae**) **ophryodonta**, spec. nov., gracilis ut videtur herbacea (basi radiceque ignotis) decumbens vel oblique ascendens ca. 3 dm. alta laxe piloso-setosa et saltim in partibus superioribus brevissime glandulari-puberula; caule debili brunneo 1–1.2 mm. diametro; internodiis plerisque 2–5 cm. longis; foliis oppositis sessilibus

oblongis apice obtusissimis vel rotundatis basi breviter angustatis primo aspectu integris sed margine per bases incrassatas capillorum minute serrulato-denticulatis (unde nomen) a basi 3-nervatis textura membranaceis 2.2–3.5 cm. longis 7–10 mm. latis utrinque pilis longis albis nodulosis attenuatis sparse ornatis; cymis terminalibus pauci (3–5)-capitulatis laxis; pedicellis gracilibus erectis glandulari-puberulis 1–2.5 cm. longis; bracteola capitulum arcte suffulciente oblonga 4.5–5 mm. longa subacuta; capitulis 1.5 cm. longis; involucri squamis oblongis 6.5–7 mm. longis 1.5 mm. latis breviter acutatis vix costulatis dorso longe sparseque appresse pilosis etiam minute glandulari-puberulis; corollae tubo proprio ca. 2.4 mm. longo sublaevi; faucibus cylindratis vix ampliatis ca. 4 mm. longis sublaevibus (an roseis?) dentibus limbi lineari-oblongis plus minusve inaequalibus ut videtur albis obtusis vel subacutis 1.5–2.5 mm. longis dorso puberulis; achaeniis homomorphis 8–10-costatis 5 mm. longis in costis obsolete scabratis; pappi aristis ejusdem achaenii ca. 17 corollam subaequantibus sursum barbellatis.—URUGUAY: Dept. Treinta y Tres: at Melo, *Dr. T. Schroeder*, being no. 16,325 in herb. of Mr. Cornelius Osten (phot. and small fragm. Gr.).

Prolonged efforts to place this plant satisfactorily in any hitherto described species have failed. Though manifestly related to *S. multiaristata* Spreng. it differs in its broader and blunter setiferous leaves, much longer internodes and decidedly blunter phyllaries. In pubescence it recalls the rather recently described Uruguay species *S. sabulonis* Robinson, but that has a denser inflorescence, acute phyllaries and far more coarsely toothed leaves of obovate tendency and with more gradually narrowed base.

Symphyopappus tetrastichus, spec. nov., ut dicitur frutescens verisimiliter erectus (basi ignota) griseo-tomentellus; caule subtereti costellato; internodiis plerisque 1.4–2 cm. longis; foliis alternis sessilibus anguste oblongo-oblanceolatis obtusis mucronulatis integris basi attenuatis 5.5–6.5 cm. longis 7–10 mm. latis 3-nervatis paullo laxe reticulatis erectis concoloribus griseis firmiter membranaceis; panicula corymbosa alterniramea ovoidea rotundata 1.5–2.3 dm. alta 1–1.5 dm. diametro; capitulis 4-floris ca. 12 mm. longis ad apices ramulorum aggregatis; pedicellis 3–7 mm. longis; involucri squamis 15–16 tetrastichis inaequalibus lanceolato-oblongis, extimis brevibus acutiusculis, interioribus gradatim longioribus obtusis vel (saltim intimis) apice rotundatis secundum mediam partem paullo incrassatis et subherbaceis sed in lateribus tenuibus scariosis; corollis tubulatis 6–7 mm. longis; dentibus limbi deltoideo-ovatis ca. 0.7 mm. longis; achaeniis crassiusculis deorsum breviter attenuatis 5-angulatis fuscescentibus

praesertim in angulis hispidulis; pappi setis ca. 60 substramineis basi paullo connatis in seriebus · brevibus conjunctim delabentibus.—BRAZIL: Goyaz: Serra dos Pyreneos, *Glaziou*, no. 21,593 (TYPE, in herb. N. Y. Bot. Gard., phot. and small fragm. Gr.).

In listing his number 21,593 in Mém. Soc. Bot. Fr. iii. 375 (1909) Glaziou calls it *Vernonia frutescens* Glaziou, n. sp., but leaves it without diagnosis. Clearly the plant is not a *Vernonia*, a fact noticed by the late Dr. Ekman who annotated the New York sheet as "*Eupatorium* new species." It seems equally clear to the writer that the plant is not a *Eupatorium* on account of its regularly 4-flowered heads, its peculiar involucre, and its slightly but distinctly connate pappus-bristles. Its imbricated and multiseriate phyllaries prevent its being classed in *Mikania* or *Kanimia*. However, it is essentially in agreement with *Symphyopappus* and seems naturally placed in that genus, where the pappus-bristles are normally somewhat connate at base. It is worth while to note furthermore that the phyllaries in *Symphyopappus compressus* (Gardn.) Robinson and in some of the other species of the genus tend to dispose themselves in upright rows, as in the plant here under consideration, though less exactly so.

In *S. tetrastichus* the receptacle of the 4-flowered head is not quite square but is somewhat rhombic, with the result that the 4 upright series of phyllaries are not at equal distances from each other but somewhat approximated in pairs.

Though Glaziou's undescribed *Vernonia frutescens* has no nomenclatural validity, the specific name would have been gladly adopted if there had been certainty that the plant so called by Glaziou (which would then become automatically the historic type) was in fact identical with the specimen, without specific determination, which has been found under Glaziou's number 21,593 in the herbarium of the New York Botanical Garden. However, as some numbers of Glaziou's very extended and valuable series have been found to cover diverse elements, it seems best not to base a new species on a specimen not personally examined, nor would the name selected by Glaziou for use under the genus *Vernonia* have any distinctive quality if employed in *Symphyopappus*, a group in which most of the species are frutescent to fruticose.

Eupatorium (§ **Cylindrocephala**) **anachoreticum**, spec. nov., verisimiliter herbaceum et perenne (basi ignota); caule subtereti post exsiccationem costulato sordide tomentoso usque ad inflorescentiam terminalem folioso; internodiis plerisque 1–3.5 cm. longis; foliis oppositis sessilibus late patentibus attenuatis serratis basi cuneatis integris a basi 3-nervatis supra primo crispe pubescentibus deinde a

basibus pilorum delapsorum paullo scrabridulis, subtus molliter brunnescente tomentosis 6–7 cm. longis 1.5–2 cm. latis membranaceis; panicula hemisphaerica cymoso-ramosa densiuscula foliaceo-bracteata; capitulis terminalibus subsessilibus, lateralibus (2–5 mm. longe) pedicellatis, 9–11 mm. longis, 5–8 mm. diametro ca. 20-floris; pedicellis sordide tomentosis; involucri ovoideo-subcylindrati squamis ca. 5-seriatim arcte imbricatis oblongis apice rotundatis neque squarrosis neque appendiculatis dorso purpurascentibus plerisque 3-striatis ad apicem versus paullulo hirtellis aliter subglabris; corollis ut videtur purpureis gracilibus 5 mm. longis, dentibus limbi brevissimis; achaeniis gracilibus 3 mm. longis deorsum decrescentibus fuscis sed in angulis pallidis sursum minutissime scabratis; pappi setis ca. 35 sordide vel lutescente albis corollas aequantibus.—PERU: Chachapoyas, *Mathews* (TYPE, in herb. Univ. Geneva, phot. and sm. fragm. Gr.).

This species, known solely from an unnumbered specimen said to have been a part of Mathews's last collection, in habit much resembles *E. leptocephalum* DC. var. *hypomalacum* Robinson, but may be readily distinguished by its much larger heads with about 25 instead of 8–10 florets, its somewhat ovoid instead of slenderly cylindrical involucre, as well as by its smaller practically sessile leaves with more closely matted tomentum on the lower surface. The name alludes to the retiring nature of a plant which has thus far escaped rediscovery for nearly a century.

E. (§ **Eximbricata**) **Arsenei**, spec. nov., herbaceum erectum vel paullo decumbens ca. 1 m. altum praesertim ad nodos versus laxe patenter pilosum; caule tereti saepe purpureo-tincto ca. 4–5 mm. crasso; internodiis plerisque 6–10 cm. longis; foliis oppositis petiolatis late ovatis acuminatis grosse crenatis basi patenter cordatis 3 (–7)-nervatis membranaceis utrinque viridibus sparse in nervis hirtellis ca. 5 cm. longis et 4 cm. latis; petiolis gracilibus, foliorum mediorum ca. 4 cm. longis, foliorum superiorum multo brevioribus; cymis paucicapitulatis rotundatis subumbelliformibus in paniculam magnam laxam dispositis; pedicellis gracilibus plerisque 3–7 mm. longis; capitulis ca. 5 mm. altis 7 mm. diametro 30-floris; involucri squamis subaequalibus anguste oblongo-lanceolatis vel linearioblongis obtusis vel vix acutatis dorso saepius 2-nervatis; corollis albis, tubo proprio gracili 1.5–2 mm. longo, faucibus campanulatis 0.7–1 mm. altis, dentibus limbi 0.7–0.9 mm. longis; achaeniis atrobrunneis 1.6 mm. longis in angulis sursum hispidulis; pappi setis albis barbellatis.—MEXICO: Michoacan: vicinity of Morelia at Carrindapaz, Nov. 8, 1911, *Bro. G. Arsène*, no. 6080 (TYPE, in Gray Herb., isotypes U. S., Mo.), near Loma of La Huerta, alt. 1950 m., Sep. 1,

1910, *Arsène*, nos. 5489 (Gr., U. S.) and 6619 (U. S., Mo.); Cerro San Miguel, alt. 2100–2200 m., Dec. 1910, *Arsène*, nos. 5302 (U. S., Mo.) and (doubtfully) 5201 (Gr., U. S., Mo.), the latter being too immature for certain determination.

This species is obviously related on the one hand to *E. choricephalum* Robinson, which however has narrower more sharply pointed phyllaries and much more diffuse panicle, and on the other to *E. lasium*, a plant with distinctly larger heads and shaggy stems.

E. ASPERULACEUM Bak. in Mart. Fl. Bras. vi. pt. 2, 342 (1876). To the synonymy of this species may be added *E. pseudopraxelis* Hieron. Verh. Brandenb. Bot. Ver. xlviii. 200 (1907). Neither in habit nor in any significant character do these plants seem to differ. Their types were both collected near the junction of the Rio Negro with the Amazon and are certainly conspecific.

EUPATORIUM AZANGAROENSE and E. SCOPULORUM.—Some years ago, when revising the Eupatoriums of Peru and of Bolivia, the writer maintained the then but little known *E. scopulorum* Wedd. and keyed it apart from *E. azangaroense* Sch.-Bip. Even at the time this seemed a doubtful course since the differential traits to be gleaned from their original descriptions in Weddell's "Chloris Andina" were of a decidedly unconvincing nature. Subsequent study of the more copious material now available and examination of photographs of types and authoritatively determined plants in several of the European herbaria have brought convincing evidence that no satisfactory or natural distinction between these plants can be made. It is therefore desirable that they should be united and one of the two names selected. *E. scopulorum* Wedd. and *E. azangaroense* Sch.-Bip. were first described by Weddell, Chlor. And. i. 216–217 (1857) and therefore, in accordance with Art. 46 of the International Rules of Botanical Nomenclature, they may be united under either of the names. To the writer it seems best to select *E. azangaroense* Sch.-Bip. as the binomial to be maintained and *E. scopulorum* Wedd. as the name which should pass into synonymy. The reasons for this choice are as follows: 1) *E. azangaroense* Sch.-Bip., though not characterized until described by Weddell, was the earlier name to reach print. See Bonplandia, iv. 54 (1856). 2) The historic type of *E. azangaroense* has much greater definiteness, being one of a numbered series, Hohenaker's "Lechleri plantae peruvianae" no. 1776, therefore easily checked in several of the larger herbaria. 3) The type of *E. azangaroense* has become through photographic prints in recent years much better known than that of *E. scopulorum*. 4) *E. azangaroense* is immediately associable with a definite type-locality, Azangaro, Peru. These con-

siderations are believed to outweigh the facts that *E. scopulorum* had slight page priority, that it was illustrated by a (none too good) plate, and that when characterizing *E. azangaroense*, Weddell confused with it extraneous material ranging as far afield as Ecuador and even northern Colombia, where material conspecific with the plant of Schultz has never been confirmed.

E. (§ **Eximbricata**) **atrocordatum**, spec. nov., fruticosum vel saltim frutescens (basi ignota); caule ramisque teretibus brunneis juventate incurvo-puberulis tardius glabratis; internodiis plerisque 4–6 cm. longis; foliis acuminatis serrato-dentatis patenter cordatis a basi 3-nervatis in nervis minute puberulis aliter glabris exsiccatione nigrescentibus, caulinis maximis 5–6 cm. longis 4–5 cm. latis, rameis multo minoribus, superioribus profunde cordatis; petiolis plerisque 1–2 cm. longis; corymbo terminali composito planiusculo multicapitulato obscure brevissimeque incurvo-puberulo; pedicellis filiformibus 8–12 mm. longis flexuosis; bracteolis filiformibus 1–2 mm. longis; capitulis ca. 5.5 mm. altis et 6.5 mm. diametro ca. 40-floris; involucri squamis ca. 15, eorum ca. 13 subaequalibus lineari-oblongis obtusis vel apice rotundatis ad apicem versus eroso-ciliolatis dorso plerumque 2-nervatis subglabris, extimis 2–3 multo brevioribus linearibus vel anguste oblongis subherbaceis minute puberulis; corollis albis, tubo proprio gracili glabro ca. 1.3 mm. longo, faucibus turbinato-subcampanulatis ca. 1.5 mm. longis glabris, dentibus limbi ca. 0.6 mm. longis in angulis sursum paullo scabratis; pappi setis 20–25 tenuibus albis corollas subaequantibus.—Mexico: Chiapas: Cerro del Boqueron, Sep. 1913, *C. A. Purpus*, no. 6796 (type, in herb. Univ. Calif., phot. and small fragment Gr.).

This perplexing plant from its subequal phyllaries technically falls into § *Eximbricata*, yet its nearest allies appear to be *E. pycnocephalum* Less. and several local and little known species which group themselves about this widespread and variable type. From *E. pycnocephalum* itself *E. atrocordatum* differs in its much flatter, more corymbous and much less glomerate inflorescence, narrower outer phyllaries, less imbricated median phyllaries and conspicuously cordate rameal leaves. From the delicate annual *E. microstemon* Cass. it differs in its shrubby or at least suffruticose habit, flatter inflorescence and cordate leaves. The nearly related *E. viscidipes* Robinson and *E. Seleri anum* Robinson of Guatemala have much more imbricated involucres, and neither of them has cordate rameal leaves. Both furthermore differ in several minor traits, such as pubescence, viscidity, etc. Probably the closest relative of *E. atrocordatum* is the little known *E. multinerve* Benth., but that has a more open and

elongated panicle and somewhat shorter-petioled more numerously nerved leaves, which have incisely crenate rather than serrate-dentate margins and are by no means so deeply cordate.

The fanciful name is of course suggested by the nigrescent conspicuously heart-shaped rameal leaves. These, in fact, are of a rather unusual character. In nearly all plants having cordate stem-leaves, the uppermost cauline and the rameal leaves show less and less tendency to be heart-shaped and are apt to become rounded, obtuse or even acutish at base. Here, however, the rameal leaves, though of reduced size, are more deeply cordate than the stem-leaves.

E. (§ **Cylindrocephala**) **boyacense**, spec. nov., fruticosum subscandens 2–3 m. altum inflorescentia obscure fulvido-puberula et foliis subtus minutissime hirtellis exceptis glabrum exsiccatione paullo nigrescens; caule subtereti fusco-maculato ut dicto 2.5–7.5 cm. crasso; internodiis 6–12 cm. longis; foliis oppositis graciliter petiolatis acuminatis argute serratis vel serrulatis (dentibus 0.5–1 mm. altis inter se 2–6 mm. distantibus) basi rotundatis penniveniis supra glabris obscure venuloso-reticulatis (venulis saepe minute sulcatis) subtus obsolete strigillosis (in venis venulisque paullo exsertis), lamina 7–9 cm. longa 3.5–5 cm. lata textura membranacea; petiolo gracili plerumque 1–2 cm. longo; panicula composita oppositiramea pyramidali; capitulis ca. 12-floris ca. 11 mm. longis subsessilibus vel usque ad 4 mm. longe pedicellatis ad apices paniculae ramulorum glomeratis; bracteolis ovatis obtusis; involucri squamis ca. 25 atrobrunneis 5–6-seriatim imbricatis ciliolatis aliter subglabris apice rotundatis; corollis gracillimis tubulatis ca. 6 mm. longis albis glabris; dentibus limbi vix 0.4 mm. longis; achaeniis glabris 3.3 mm. longis; pappi setis ca. 40 laeviusculis albidis ca. 5 mm. longis.—COLOMBIA: tall forest of Mt. Chapón region, alt. about 90 m., in extreme western part of Dept. Boyaca, *A. E. Lawrance*, no. 279 (TYPE, in Field Mus., phot. and fragm. (Gr.).

Among the Colombian Eupatoriums of § *Cylindrocephala*, this plant seems closest to *E. lebrijense* Robinson and *E. leucolithogenum* Robinson. Both of these have somewhat more numerously flowered heads (with 15–20 florets) and larger more palmately nerved leaves pointed rather than rounded at base. Furthermore, the reticulation of the veinlets on the upper leaf-surface in *E. boyacense* is closer than in either of the others, and the veinlets themselves have a perceptibly different nature, being minutely furrowed or scored. In *E. leucolithogenum* the phyllaries are narrowed to an obtuse tip, while in both *E. lebrijense* and *E. boyacense* they are of more linear-oblong form with rounded tip.

E. (§ **Chromolaena**) **Chaseae**, spec. nov., herbaceum vel paullo suffruticosum erectum ca. 1 m. altum; radicis fibris paucis paullo incrassatis duris e caudice subgloboso lignoso ca. 2.5 cm. diametro orientibus; caule subtereti post exsiccationem costulato brunneo usque ad inflorescentiam oppositirameam subsimplici; internodiis plerisque 2–5 cm. longis; foliis oppositis breviter petiolatis rhombeo-ovatis vel subobovatis obtusis grosse supra mediam partem dentatis ad basin versus longe cuneatis et integris textura duris supra breviter scabro-puberulis subtus reticulato-venulosis et griseo-subvelutinis paullo supra basin 3–5(–7)-nervatis; caulinis usque ad 7–5 cm. longis et 3.5 cm. latis; petiolo vix 5 mm. longo; foliis supremis et rameis oblongis serratis basi breviter cuneatis multo minoribus; ramis plerisque 5–10 cm. longis oppositis adscendentibus; capitulis ovalibus vel subcylindricis ca. 30-floris 13 mm. longis pedicellatis; involucri squamis ca. 40 multiseriatim imbricatis eburneis apice rotundatis dorso striatis margine minutissime ciliolatis; corollis palidissime lilaceis ca. 5.5 mm. longis; tubo et faucibus non distinctis; dentibus limbi deltoideis dorso glandulis globosis instructis; achaeniis gracilibus paullo deorsum decrescentibus ca. 3.8 mm. longis; pappi setis ca. 30 albidis sursum barbellatis.—Brazil.: State of Minas Geraes: stony campo, Morro do Cruzeiro, Lagoa Santa 42 km. north of Bello Horizonte, alt. 850 m., Mar. 23–24, 1925, *Mrs. Agnes Chase*, no. 9013 (type, in Gray Herb.).

As the little Section *Chromolaena*, to which this species is to be referred, does not seem to have been keyed since Baker in Mart. Fl. Bras. vi. pt. 2, 300 (1876) recognized but two species, the following summary of the more striking differences and pertinent synonymy of the five now known members of the group may be welcome.

Key to the Species of Eupatorium § Chromolaena

Base of leafblade cuneate
- Heads thick-ovoid; phyllaries purple-tinged, often slightly puberulent dorsally but not ciliolate; leaves lanceolate, crenate-serrate ..... 1. *E. horminoides*
- Heads subcylindric-ovoid; phyllaries ivory-white, nearly glabrous dorsally but ciliolate on margin; leaves (the main cauline) obovate-cuneate, coarsely and rather sharply dentate ..... 2. *E. Chaseae*

Base of leafblade blunt, rounded or even subcordate.
- Heads ovoid to subcylindric; phyllaries flattish to moderately convex.
  - Leaves relatively large, about 6 cm. long and 4.5–5 cm. wide, hirsute beneath; achenes 5 mm. long ..... 3. *E. mattogrossense*
  - Leaves smaller, 2–4 cm. long, grayish-tomentose beneath; achenes about 3.5 mm. long ..... 4. *E. calamocephalum*
- Heads subglobose; phyllaries excessively convex, the dorsal surface nearly hemispherical ..... 5. *E. epaleaceum*

1. E. HORMINOIDES (DC.) Bak. in Mart. Fl. Bras. vi. pt. 2, 300 (1876). *Chromolaena horminoides* DC. Prod. v. 133 (1836). *C. Candolleana* Gardn. in Hook. Lond. Jour. Bot. v. 464 (1846). *Eupatorium strobilanthum* Mart. Hb. Fl. Bras. n. 815 acc. to Bak. l. c.—Minas Geraes, São Paulo and Bahia.

2. E. CHASEAE Robinson (see above).—Minas Geraes.

3. E. MATTOGROSSENSE Hieron. in Engl. Bot. Jahrb. xxii. 761 (1897).—Matto Grosso.

4. E. CALAMOCEPHALUM (Bak.) Hieron. l. c. (1897). *E. horminoides* vars. *calamocephala* and *leucocephala* Bak. in Mart. Fl. Bras. vi. pt. 2, 300–301 (1876). *Chromolaena leucocephala* Gardn. in Hook. Lond. Jour. Bot. v. 465 (1846) and also *C. leucocephala* as employed in herb. by Schultz-Bipontinus. Likewise, at least as to name-bringing synonym, *Eupatorium leucocephalum* Malme, Ark. f. Bot. xxiv. no. 8, 26 (1932), not Benth.—Minas Geraes, Goyaz and São Paulo.

Beyond a slight difference in leaf-breadth no distinction is apparent between Baker's vars. *calamocephala* and *leucocephala*. The heads of the latter, when carefully compared at like stage of development with those of the former show no significant difference in size. Schultz seems to have recognized correctly enough Gardner's *Chromolaena leucocephala* and applied the name in essentially the same sense.

5. E. EPALEACEUM (Gardn.) Robinson, Proc. Am. Acad. li. 534 (1916); Malme, Ark. f. Bot. xxiv. no. 8, 26 (1932). *Chromolaena epaleacea* Gardn. in Hook. Lond. Jour. Bot. vi. 436 (1847). *Eupatorium lupulinum* Bak. in Mart. Fl. Bras. vi. pt. 2, 301 (1876).—Minas Geraes, São Paulo, Goyaz and Matto Grosso.

E. (§ **Subimbricata**) **corumbense**, spec. nov., fruticosum 1.8 m. altum griseo-tomentellum; caule (vel ramo) subtereti vix (post exsiccationem) costulato 2–3 mm. crasso paullo albido-medulloso; internodiis ca. 3 cm. longis; foliis oppositis petiolatis lanceolatis obtusis grosse serrato-dentatis vel (supremis) subintegris basi cuneatis textura membranaceis pinnativeniis supra griseo-puberulis subtus distincte pallidioribus griseo-tomentellis 5–8.5 cm. longis 2–3 cm. latis; petiolo tomentello 1–1.5 cm. longo; panicula pyramidata oppositiramea usque ad mediam partem foliaceo-bracteata; capitulis ca. 11-floris 5 mm. altis plerisque breviter pedicellatis; involucri squamis ca. 3-seriatim laxe imbricatis valde inaequilongis lanceolatis dorso griseo-viridibus tomentellis margine pallidioribus subscariosis; corollis albis glabris sed plus minusve ad limbum glanduloso-atomiferis; tubo proprio in fauces gradatim ampliato; dentibus limbi vix 0.5 mm. longis; achaeniis angulis hispidulis 2 mm. longis; styli ramis ad apicem distincte sed brevissime clavatis et fuscescentibus; pappi

setis inaequalibus ca. 25 albis barbellatis.—BRAZIL: Matto Grosso: on an isolated mountain on edge of tree-line, Urucum, Corumbá, alt. about 550 m., April 1927, *Miss Dorrien Smith*, no. 94 (TYPE, in herb. N. Y. Bot. Gard., phot. Gr.).

In its inflorescence, small heads, and dark abruptly clavate style-branches, this species recalls the genus *Ophryosporus*, but its anthers are distinctly appendaged at the tip. Abruptly clavate style-branches, like those of *Ophryosporus*, occur also in some other species of *Eupatorium*, as for instance in *E. dentatum* Gardn. and in the recently described *E. subcapitatum* Malme.

E. (§ **Subimbricata**) **huantae**, spec. nov., fruticosum erectum 1.2–1.8 m. altum crispe puberulum; caule tereti purpureo-brunneo albo-medulloso; internodiis plerisque 6–8 cm. longis; foliis oppositis graciliter petiolatis ovatis longe acuminatis lateraliter paucidentatis basi leviter cordatis concoloribus utrinque puberulis textura firmiter membranaceis plerisque 4–5.5 cm. longis 3 cm. latis; petiolo 9–12 mm. longo; panicula terminali ovoidea oppositiramea foliaceo-bracteata 2.5 dm. alta 1.3 dm. diametro; bracteolis parvis et minimis lanceolatis; pedicellis plerisque 4–7 mm. longis; capitulis ca. 24-floris 8 mm. altis; involucri ca. 3-seriatim imbricati squamis ca. 20 purpureo-viridibus griseo-puberulis, extimis et intermediis lanceolatis acutis, intimis oblongis ad summum versus lacerato-ciliatis obtusis sed argute mucronulatis; corollis glabris 3.3 mm. longis, tubo et faucibus vix distinguendis cylindratis albis, dentibus limbi viridibus (sec. adnot. lectorum) vix 0.3 mm. longis; styli ramis clavatis aureo-flavis; achaeniis (immaturis) glabris pallidis 2.6 mm. longis; pappi setis albis ca. 30.—PERU: Dep. Ayacucho: Huanta, in arid thickets, about 2800 m. alt., *Killip & Smith*, no. 23,337 (TYPE, in Gray Herb.).

Traced by the author's key to the Eupatoriums of Peru published in 1919, this plant would fall with *E. gracilentum* Robinson, an herbaceous plant, which has smaller far more loosely panicled heads, and with *E. Cookii* Robinson, which is villous with purple-jointed hairs and has much shorter-pedicelled, indeed almost sessile, heads.

E. (§ **Subimbricata**) **hylophorbum**, spec. nov., herbaceum erectum verisimiliter perenne ca. 8 dm. altum; caule paucirameo tereti post exsiccationem costulato purpurascente brunneo ut petioli et costa et nervi foliorum subtiliter fulvescenteque puberulo; internodiis 4–12 cm. longis; foliis oppositis graciliter petiolatis ovato-oblongis acutis dentatis vel crenatis vel (supremis) subintegris basi obtusis in nervis venisque principibus brevissime puberulis aliter glabris bene supra basim pinnatim 5-nervatis subtus laxe prominulenter subduplice reticulato-venosis 7–11 cm. longis 2.5–4.5 cm. latis exsiccatione

fuscencentibus textura membranaceis; petiolo 1–2 cm. longo; panicula terminali oppositiramea basi foliaceo-bracteata; ramis late patentibus solum prope apicem capituliferis; capitulis breviter pedicellatis subglomeratis ca. 25-floris 5 mm. altis et crassis; involucri campanulati squamis ca. 20 ca. 4-seriatim imbricatis ovatis vel ovato-oblongis vel (intimis paucis) sublinearibus apice rotundatis dorso glabris conspicue striatis; corollis glabris gracilibus 3 mm. longis; tubo et faucibus viridescente albis; dentibus limbi perbrevibus rubescente azureis; achaeniis 1.5 mm. longis glabris; pappi setis ca. 30 albis 3 mm. longis.—PERU: Dept. Junín: Pichis Trail, Dos de Mayo, alt. 1700–1900 m., in dense forest, July 2–3, 1929, *Killip & Smith*, no. 25,827 (TYPE, in Gray Herb.).

In habit this species somewhat resembles *E. vestitum* Poepp. which however has larger more regularly pinnate-veined and less toothed leaves, and is clothed with a dense and much longer indument.

E. HYPOMALACUM Robinson, Bot. Gaz. XXXV. 4 (1903). This shrubby species of § *Subimbricatum* with small thyrsoid heads, acute lanceolate to linear-oblong phyllaries and pinnately veined leaves, though described nearly thirty years ago has, until now, been known only from the original material collected by Heyde & Lux at Los Verdes, Dept. Amititlán, Guatemala. However, on a collecting trip made by Professor R. H. Wetmore and Dr. E. C. Abbe to Barro Colorado Island in the Panama Canal Zone they secured among other specimens a plant which in essentials of habit, inflorescence, floral structure, achenes, etc., so closely agrees with the Guatemalan type of *E. hypomalacum* as to suggest that the two should be treated as varieties of the same species. The distinctions noted are as follows:

Var. **typicum** foliis subintegris sed obscure denticulatis discoloribus 12–14 cm. longis 3.5–4.5 cm. latis subtus molliter pubescentibus et cum glandulis sphaericis lucidis ornatis supra viridibus minute prominulenterque reticulatis areolis ultimis perspicue circumscriptis.—GUATEMALA: Los Verdes, Depart. Amititlán, alt. 1100 m., *Heyde & Lux*, no. 6157 (in series of J. D. Smith).

Var. **Wetmorei**, var. nov., var. *typico* habitu inflorescentiaque simillimum; foliis paullo amplioribus 12–20 cm. longis 3.5–6.5 cm. latis aliquando distincte serratis concoloribus supra obscure reticulatis (areolis ultimis vix definiter claussis) subtus obscure puberulis atro-puncticulatis.—CANAL ZONE: Barro Colorado Island, D. Fairchild Trail, alt. about 800 m., Dec. 26, 1931, *R. H. Wetmore & E. C. Abbe*, no. 77 (Gray Herb.); also on lakeshore, east of landing, no. 87 (Gr.) of same series.

E. LANICAULE Robinson, Proc. Am. Acad. XXXV. 336 (1900). Of

this Central American species, described more than thirty years ago from specimens collected by Dr. Sereno Watson in the eastern parts of Vera Paz and Chiquimula, Guatemala, no rediscovery has thus far been reported. It may be well therefore to record the fact that the same species has recently been collected in British Honduras by Mr. W. A. Schipp, being his number 1096 from Fern Hill, Toledo, alt. about 91 m. The field memoranda indicate it as a "Tall shrub 6 ft. high 2 ins. in diam., growing on hillside in forest shade." The plant is said to be "occasional" and the flowers "white flushed red." The specimens of this number were distributed as *Eupatorium Oerstedianum*, a relatively common species with leaves more narrowly oblong, less deeply toothed and more abruptly narrowed, rounded or even subamplexicaul at the base. Furthermore, the heads of *E. Oerstedianum* are typically of § *Cylindrocephala* and the involucre remains closed and cylindrical even after drying, while in *E. lanicaule* the involucre in drying spreads and takes on an open campanulate form as frequently happens in § *Subimbricata* but not in § *Cylindrocephala*.

E. (§ **Subimbricata**) **Loefgrenii**, spec. nov., fruticosum erectum 8 dm. altum; caule tereti dense fulvideque tomentello ca. 5 mm. diametro albo-medulloso ad inflorescentiam virgato foliifero; foliis (supremis alternis exceptis) suboppositis sessilibus ovalibus vel late ellipticis obtusis vel apice rotundatis leviter crenato-dentatis penniveniis utrinque duplicate reticulato-venulosis 6–8 cm. longis 4–5 cm. latis firmiter coriaceis supra in venulis leviter exsertis glanduliferis subtus in venulis conspicue exsertis hirtellis; panicula terminali densa pyramidata; capitulis ca. 8-floris breviter pedicellatis ca. 8–9 mm. longis; involucri squamis inaequalibus ca. 3-seriatim imbricatis oblongo-lanceolatis acutis sed non attenuatis plerisque 2-costatis pallidis; corollis albidis 5-nervatis; tubo proprio gracili 3 mm. longo glandulis paucis sessilibus ornato; faucibus turbinato-subcampanulatis ca. 1.5 mm. altis; dentibus limbi brevibus subacutis vix 0.3 mm. longis; styli ramis apice subabrupte incrassatis fere capituliferis nigrescentibus; achaeniis (immaturis) pubescentibus ca. 3 mm. longis; pappi setis ca. 45 barbellatis ochroleucis 5 mm. longis.—BRAZIL: State of São Paulo: in campo, S. José dos Campos, *Alberto Löfgren*, no. 120 (TYPE, in Mus. Bot. Stockholm, phot. and small fragm. Gr.).

This plant, though pretty clearly related to *E. dictyophyllum* DC., has much less deeply toothed leaves, which are neither so hairy nor so cuneate at base. In *E. dictyophyllum* furthermore the phyllaries are caudate-attenuate and the heads about 5-flowered. *E. Loefgrenii* is also in many ways similar to *E. Warmingii* Bak. but that has smaller leaves, of obovate tendency, more cuneate at base and smooth-

er above, since the secondary veinlets are scarcely evident and little if at all exserted. Moreover the phyllaries of *E. Warmingii* are caudate-tipped and the style-branches scarcely clavellate instead of abruptly and definitely thickened as in *E. Loefgrenii*.

E. Luxii Robinson, Proc. Am. Acad. xxxvi. 480 (1901). Dr. A. F. Skutch, who collected material of this local and little known Guatemalan species at Santa Elena, Dept. Chimaltenango, Feb. 26, 1933, reports the plant as arborescent, reaching a height of 25 feet and diameter 4 inches. He also states that it was found along a stream in the cloud forest at an altitude of about 2745 m. and had bright lavender flowers. Dr. Skutch's specimens of this species show clearly that, without any other visible change of character, it may be, like the type, opposite-leaved (as in the specimen of Skutch's no. 289 at the Gray Herbarium) or alternate-leaved (as in the case of the same number at the U. S. National Herbarium).

E. malachophyllum Klatt, Arb. Bot. Mus. Hamb. [an advance reprint] page 3 (1890) and Jahrb. Hamb. Wissensch. Anstalt. ix. pt. 2, page 125 (1892). This species was based on a specimen of Ule's no. 1508, collected on slopes of the Serra de Oratorio in the state of Santa Catharina, Brazil. Hieronymus evidently wholly overlooked the publication of this plant, for when he published his *E. Niederleinii* in Engl. Bot. Jahrb. xxii. 763 (1907), which was based on Niederlein's no. 1472 from Cabaceras in the Argentine province of Misiones, he appended a "var. *latifolia*" also founded on Ule's no. 1508 from Santa Catharina. In other words, this supposed broader-leaved variety of his *E. Niederleinii* was isotypic with Klatt's already published *E. malachophyllum*, which in consequence must of course be accepted as the correct specific name. The question which naturally arises is whether the typical *E. Niederleinii* of Argentina is even varietally separable. After examining the types of both, as well as conspecific material subsequently collected in the Brazilian state of São Paulo by Hammar (Gr.) and by Brade, no. 5708 (Gr., Stkh.) and in the Argentine Misiones by Rodriguez, no. 553 (Gr.) and Grüner, no. 468 (Gr.), the writer finds that the distinctions of leaf-breadth and number of florets, mentioned by Hieronymus, show little constancy or significance. It is true that the Brazilian specimens average somewhat more copiously silky-villous, but this is only a matter of degree and as a difference would seem to have no more than formal value.

E. (§ **Subimbricata**) **mercedense**, spec. nov., scandens, ut videtur subherbaceum, aspectu glabrum sed subtiliter puberulum; caule tereti gracili purpurascente viridi; internodiis plerisque 4–12 cm. longis; foliis oppositis graciliter petiolatis lanceolato-ovatis apice

attenuatis lateraliter argute serratis basi rotundatis supra glaberrimis subtus in nervis obscure puberulis trinervatis textura firmiter membranaceis vel subchartaceis 5–6.5 cm. longis 2–2.5 cm. latis impunctatis; petiolo 1–1.6 cm. longo; panicula ampla laxissima oppositiramea 4 dm. alta 2 dm. diametro foliaceo-bracteata; bracteolis parvis lanceolatis integris sessilibus; pedicellis filiformibus plerisque 7–10 mm. longis; capitulis ca. 24-floris 6 mm. altis 5 mm. diametro; involucri turbinato-campanulati squamis ca. 20 subtriseriatim imbricatis viridibus striatis, extimis lanceolato-ovatis acutis obscure puberulis, intermediis et intimis gradatim longioribus lineari-oblongis obtusiusculis subglabris; corollis glabris; tubo proprio ca. 0.5 mm. longo; faucibus subcylindratis 2 mm. longis viridi-albis; dentibus limbi deltoideis 0.3 mm. longis pallide azureis; achaeniis nigris 1.5 mm. longis glabris; pappi setis ca. 30 albis tenuibus 2 mm. longis.—PERU: Dept. Junín, La Merced, alt. about 700 m., in thickets, May 29–June 4, 1929, *Killip & Smith*, no. 23,793 (TYPE, in Gray Herb.).

This species in habit recalls *E. laxum* Gardn. of Minas Geraes, Brazil and possibly may prove to be a geographically remote and much modified form of it; but the two plants differ in so many minor characters that they can scarcely be treated as conspecific until some intergradation can be demonstrated. In *E. laxum* the leaves are of softly membranaceous texture, finely pubescent on both surfaces and rather bluntly serrate with incurved teeth, while in *E. mercedense* they are very much firmer in texture, quite glabrous and somewhat lucid above and serrate with sharper more spreading teeth. In *E. laxum* the phyllaries usually have two paler ribs. In *E. mercedense* there are usually three or more ribs on the phyllaries. In *E. laxum* the leaves (in a dried condition) are nearly or quite concolorous while in *E. mercedense* the lower surface dries to a pale green and the upper to a much darker olivaceous shade.

E. (§ **Conoclinium**) **Mexiae**, spec. nov., herbaceum perenne 2 m. altum patenter pilosum, pilis albis saepius curvatis nodulosis attenuatis cum glandulis globularibus sessilibus lucidis intermixtis; caule subtereti multicostulato fistuloso repetite trichotomo, axe principe ab ramis lateralibus saepius superato; foliis oppositis graciliter petiolatis deltoideo-ovatis acuminatis obtuse serrato-dentatis basi late cordatis vel (foliis superioribus) rotundato-subtruncatis supra praecipue in superficie subtus secum nervis venisque pilosis 9–16 cm. longis et latis membranaceis utrinque viridibus; petiolo 6–11 cm. longo; cymis sublaxis paucicapitulatis conjunctim paniculam foliaceo-bracteatam formantibus; pedicellis gracilibus plerisque 1–3 cm. longis; capitulis magnis ca. 1.5 cm. altis et 2 cm. diametro ca. 140-

floris; involucri campanulati squamis ca. 3-seriatim imbricatis obtusis valde inaequalibus, extimis latissime ovatis viridibus dense pilosis et glandulari-punctatis, intermediis oblongo-ovatis striatis, intimis sublinearibus; corollis ut videtur albis glabris, tubo proprio gracili 2.7–3 mm. longo, faucibus subturbinato-campanulatis ca. 0.9 mm. longis, dentibus limbi brevissimis (0.2–0.3 mm. longis) late deltoideis; achaeniis apice obtuse appendiculatis; styli ramis longissimis filiformibus ut videtur aurantiacis; achaeniis nigris saepius plus minusve curvatis hispidulis basi calloso-appendiculatis 1.7 mm. longis; pappi setis ca. 35 capillaribus microscopice barbellatis ca. 3 mm. longis.—BRAZIL: Minas Geraes: District Carangola: rocky hill to southwest, Fazenda de Gramma, 3 leagues south of Areponga, alt. 900 m., Jan. 25, 1930, *Mrs. Ynes Mexia*, no. 4226 (TYPE, in Gray Herb., isotype U.S.).

A well marked novelty, recalling in its habit and many of its characters both *E. apiculatum* Gardner and *E. hemisphaericum* DC., but readily distinguished from each by its far larger heads and much more numerous florets. This noteworthy addition to the Brazilian flora is another of the highly interesting plants brought to scientific attention by the admirable exploration of Mrs. Ynes Mexia for whom it may appropriately be named. The specimens studied are those sent for identification to Washington and Cambridge by Mrs. H. P. Bracelin of the University of California, who is engaged in editing Mrs. Mexia's extensive collection.

E. MICROSTEMON Cass. Dict. XXV. 432 (1822). To the synonymy of this species may now be added the long obscure *E. microcephalum* Regel, a plant described from garden material, believed to have been of Colombian origin. When preparing his revision of the Colombian Eupatoriums (Proc. Am. Acad. liv. 264–330) the writer was unable to see any specimen even supposed to illustrate the plant of Regel. Some years later, however, when Mr. Alfred Rehder of the Arnold Arboretum was visiting for botanical work the scientific establishments of Leningrad, he very obligingly undertook the commission to see whether anything authentic could be found for the obscure *E. microcephalum* at that center. In this he was entirely successful, finding a sheet so labelled in hand of Regel in the herbarium at the Botanic Garden. Mr. Rehder was permitted to take a photograph of the sheet and through the kindness of the management of the herbarium was supplied with some small but characteristic fragments, sufficient to show details of the involucre, florets, leaf-texture, pubescence, etc. Careful examination of this material makes it clear that Regel's *E. microcephalum* differs in no significant trait from the

delicate tropical American annual of wide distribution much earlier characterized as *E. microstemon* Cass. In several respects Regel's description was misleading, since he characterized the plant as suffruticose, and suggested its relationship with *E. trapezoideum* Kunth, with which it certainly has no close affinity. Furthermore, the leaves of his material, grown doubtless in rich garden soil, are larger than those usually found in the wild. For these reasons it is by no means remarkable that his species has not been recognized from its description; nor is it surprising that Regel did not know of the much earlier *E. microstemon* Cass., a species which did not attain clear recognition until considerably later.

A nearly related plant of Peru may be put on record as follows:

Var. ? **perennans**, var. nov., perenne var. *typico* paullo elatius usque ad 1.2 m. altum; foliis quam apud var. *typicum* paullo majoribus (usque ad 8 cm. longis et 5 cm. latis) textura paullo firmius membranaceis; panicula laxiori, ramis inflorescentiae patentibus elongatis nudiusculis.—PERU: Dept. Ayacucho: Aina between Huanta and Rio Apurimac, alt. 750–1000 m., May 1929, in thickets, the florets pinkish white, *Killip & Smith*, no. 22,688 (TYPE, in Gray Herb.).

E. (§ **Eximbricata**) **mikaniifolium**, spec. nov., herbaceum gracile verisimiliter perenne brevissime puberulum ca. 4 dm. altum; caule tereti ca. 2 mm. diametro folioso superne ramoso; foliis plerisque alternis graciliter petiolatis deltoideis acutis in lateribus grosse dentatis basi leviter patenterque cordatis textura membranaceis utrinque puberulis a basi 3-nervatis ca. 4.5 cm. longis et 3 cm. latis; petiolo 1–1.4 cm. longo; corymbo terminali planiusculo laxo; pedicellis 6–30 mm. longis; capitulis 25–28-floris post exsiccationem hemisphaericis ca. 1 cm. altis et 2 cm. diametro; involucri squamis angustissimis linearibus perattenuatis ca. 7 mm. longis vix imbricatis plerisque 2-nervatis; corollis ut dicitur albis gracilibus ca. 7 mm. longis glabris vel ad basin versus obscure granulatis; achaeniis gracilibus 3 mm. longis pallide brunneis vix scabratis; pappi setis ca. 30 albis corollas subaequantibus.—ARGENTINA: edge of woods in firm soil, Las Bueñas, Chaco, Dec. 1932, *A. G. Schulz*, no. 237 (TYPE, in Gray Herb.).

This seems to be a well marked species not very closely related to any hitherto recorded from Argentina and not thus far found in any of the neighboring countries. The leaves, though prevailingly alternate in their arrangement, much resemble in form those of *Mikania periplocifolia* and its near relatives. The specimen from which this interesting novelty has been described was submitted to the writer's study by Mr. A. L. Cabrera of La Plata.

E. (§ **Eximbricata**) **morelense**, nom. nov. *Kyrstenia rufa* Greene,

Leafl. i. 10 (1903), not *Eupatorium rufum* Spreng. ex DC. Prod. v. 33 (1836), the latter being *Vernonia extensa* (Wall.) DC. l. c. The Mexican plant characterized by Greene as *Kyrstenia rufa* is Pringle's no. 8028 from Cuernavaca in the State of Morelos. It appears to be a good species though rather suspiciously near *E. photinum* Robinson, Proc. Am. Acad. xxxv. 338 (1900). However, *E. photinum* is essentially glabrous, while in *E. morelense* the stems, at least when young, are covered with long deflexed purple-jointed hairs. *E. photinum* also may be distinguished by its relatively narrower much more caudate-attenuate leaves and somewhat longer petioles; its heads are also a bit smaller. If, as thus seems probable, these two plants are distinct species, Greene's *Kyrstenia rufa* should have a name under *Eupatorium* of which *Kyrstenia* is but a scarcely definable section. As *E. rufum* has already been employed in the genus a new designation becomes needful. Pringle's no. 8028 was distributed as *E. ciliatum* Less., a species still obscure which, as shown by type material at the Botanical Museum in Berlin-Dahlem, is a decidedly different plant with much smaller more deeply toothed and merely acute (rather than acuminate) leaves and looser inflorescence.

E. (§ **Conoclinium?**) **moritibense**, spec. nov., ut videtur frutescens basi ignota; caule tereti superne crispe puberulo vel sordide tomentello; medulla alba; foliis oppositis graciliter petiolatis ovatis acuminatis inciso-dentatis basi breviter cuneatis textura subchartaceis pennativeniis supra viridibus sublucidis sparse minuteque granulatis subtus paullo pallidioribus prominulenter reticulatis secundum venas venulasque minute granulatis plerisque 5–8 cm. longis 3–4 cm. latis; petiolo 14–18 mm. longo; corymbo terminali composito breviter pedunculato planiusculo; capitulis ca. 12–14-floris 8 mm. longis; involucri squamis ca. 10 subaequilongis lanceolatis acutis firmiusculis 2(-3)-nervatis ca. 4 mm. longis dorso paullo puberulis; receptaculo convexo nudo; corollis 3.5–4 mm. longis graciliter tubulatis 5-nervatis verisimiliter albis vel saltim pallidis, faucibus vix ampliatis; dentibus limbi 5 vix 0.4 mm. longis; achaeniis glabris ca. 2 mm. longis; pappi setis ca. 25 inaequalibus sordide albis quam corollae brevioribus sublaevibus.—Brazil: Bahia: Moritiba, 1841, *J. Blanchet*, no. 3489 (type, in herb. N. Y. Bot. Gard., phot. Gr.).

A clearly marked species with ovate sharply, rather coarsely and even somewhat doubly dentate leaves of pinnate venation. Though the receptacle is but slightly convex, the species would seem from involucre to be best referred to § *Conoclinium*.

The place-name is spelled as on Blanchet's label Moritiba and this form, as representing current usage at the time of his visit, has been

selected for latinization. The locality in question is presumed to be the one situated about 12° 40′ S. lat. and 39° 5′ W. long. Its name is variously rendered as Maritiba, Muritiba and Murityba.

E. OBLONGIFOLIUM (Spreng.) Bak. in Mart. Fl. Bras. vi. pt. 2, 333 (1876). While pretty constant in general habit and most of its technical details this species shows marked variation in the breadth, texture and toothing of the leaves. To the varieties hitherto proposed there may be added

Var. **oxyodontum**, var. nov., foliis elliptico- vel subspatulato-oblongis tenuibus potius subcarneo-membranaceis quam subcoriaceis vix 5 cm. longis sed usque ad 2 cm. latis, superioribus argute sinuato-dentatis, dentibus 1–4 mm. longis.—ARGENTINA: Misiones: Loreto, Apr. 16, 1933, *G. Grüner*, no. 1359 (TYPE, in Gray Herb.).

With its deeply toothed almost pinnatifid upper leaves this variety differs rather conspicuously from the typical variety and from var. *elongatum* (H. & A.) Bak., both of which have subentire or at most bluntly toothed and proportionately narrower leaves. While the Paraguayan forma *odoratissimum* Hassl. has some of the upper leaves sharply toothed as in the plant here under discussion, they are much more narrowly oblong and of decidedly firmer texture as in the typical variety. No one appears to have recorded anything of the root of this species. The specimen at hand of var. *oxyodontum* shows it to be dark, firmly woody, fusiform and 1.5 cm. in diameter.

E. (§ **Subimbricata**) **pampalcense**, spec. nov., fruticosum 6 dm. altum suberectum; caule solitari curvato-adscendenti tereti 5 mm. diametro parte superiore ramoso atropurpureo dense setulis minutis nodulosis fuscescentibus sursum curvatis tecto; ramis curvato-adscendentibus foliosis; foliis oppositis petiolatis, caulinis mox delapsis ignotis, rameis deltoideo-ovatis obtusis crenatis basi cordatis parce puberulis discoloribus subtus pallide viridibus a basi 3(–5)-nerviis 1.8–2.4 cm. longis 1.4–1.8 cm. latis firmiter membranaceis; petiolo gracili 5–7 mm. longo; corymbis ramos terminantibus planiusculis modice densis basi foliaceo-bracteatis; bracteolis parvis linearibus; pedicellis filiformibus 1–1.8 cm. longis; capitulis ca. 60-floris 8 mm. altis 10 mm. diametro; involucri campanulati ca. 3-seriatim imbricati squamis ca. 23 viridibus et vinaceo-tinctis ciliatis dorso puberulis obtusis vel vix acutatis, intermediis et extimis gradatim brevioribus oblanceolato-subspatulatis, intimis subaequalibus ca. 5 mm. longis; corollis albis glabris; tubo proprio gracili 1.3 mm. longo; faucibus cylindratis 2.4 mm. longis; dentibus limbi deltoideis 0.4 mm. longis; achaeniis pallidis glabris 2 mm. longis; pappi setis ca. 20 roseis 3.5 mm. longis.—PERU: Dept. Ayacucho: Pampalca between Huanta and

Rio Apurimac, on open hillside, alt. about 3200 m., May, 1929, *Killip & Smith*, no. 22,232 (TYPE, in Gray Herb.).

This species is somewhat intermediate between § *Subimbricata* and § *Eximbricata* but seems best referred to the former, where it may be placed near *E. Cookii* Robinson, which has some habital and technical similarity, though it has narrower acute outer and middle phyllaries, smaller much fewer-flowered heads, larger leaves, etc.

E. PAUCIDENTATUM Sch.-Bip. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 297 (1876). This has long been to the writer a puzzling species. A sheet of Riedel's no. 1299 (also numbered 1727) in the Gray Herbarium is clearly labelled in the characteristic hand of Schultz "*Eupatorium paucidentatum* Sz. Bip. n. sp." It is subsimple up to the inflorescence. Its leaves are mostly about 5-toothed on each side and are obtusely narrowed at the base; the lateral as well as the terminal heads are closely sessile and the phyllaries at maturity are rather loosely imbricated in the manner of § *Subimbricata*. They are furthermore somewhat narrowed to an obtusish puberulent tip; the heads are about 6-flowered.

It seemed impossible to reconcile the traits of this plant, on which Schultz himself had worked, with the description by Baker, calling for a copiously branched plant with leaves truncate or broadly deltoid at base, pedicelled heads, a 4–5-seriate involucre, and phyllaries deltoid at tip and white-puberulent on the back. Therefore it appeared probable that, while Baker may have had some material corresponding to the original specimens studied by Schultz, his diagnosis was drawn from a mixture. Here it may be noted that, had the Riedel specimens exhibited an involucre such as described by Baker, Schultz would pretty certainly have referred the plant to *Osmia*, a group corresponding to *Eupatorium* § *Cylindrocephala*, since Schultz was disposed to maintain *Osmia* as a separate genus. The fact that Schultz placed the Riedel specimens in *Eupatorium* confirms the view that he was working upon the plant of looser involucre.

Of the material studied by Baker three sheets present in the herbarium of the Royal Botanic Gardens at Kew have been most kindly lent to the writer for examination. From these it becomes clear that Riedel's no. 1029, cited by Baker, is identical with Riedel's no. 1299 (1727) in the Gray Herbarium and labelled by Schultz as "*Eupatorium paucidentatum* Sz. Bip. n. sp."

This plant with subsimple stems, sessile heads and relatively loose involucre, which in the complex we may call Element A, proves to be indistinguishable from the broad-leaved form of the variable and previously published *E. stachyophyllum* Spreng.

The other two sheets, both labelled "*Eupatorium paucidentatum* Schtz. Bip." by Baker bear Burchell's numbers 4007-2, 4092-2, 4115, 4300-2, 4547 and 4727-2. These all have heads distinctly of the § *Cylindrocephala* and the lateral ones are at maturity perceptibly pedicelled. In all cases in which the specimens are adequate to show habit the branching is free and, as Baker states, rather copious. This may be called Element B. Manifestly conspecific with Element B are specimens of Burchell's no. 4007-2 and 4404-2 as well as Brade's no. 6221 now in the Gray Herbarium. Element B cannot be separated by any constant or satisfactory character from the earlier *E. congestum* H. & A.

It thus becomes clear that *E. paucidentatum* Sch.-Bip. should be given up as its type-element must pass into the synonymy of *E. stachyophyllum* Spreng. and the more loosely branched material with involucre characteristic of § *Cylindrocephala* though by Baker referred to *E. paucidentatum* Sch.-Bip. should be placed in *E. congestum* H. & A.

While it is true that Baker referred to *E. paucidentatum* still further material, collected by Lund, Martius, and Sello, not seen by the writer, the identity of these plants could not seriously affect the status of the species since Baker states that the name was derived from Riedel's labels of the plant studied and named by Schultz. These Riedel sheets thus clearly constitute the typical part of the species and its nomenclatural status cannot depend on material subsequently associated with it by Baker.

As to the correct designation of the earlier species *E. congestum* H. & A. it may be added that there appear to be no very satisfactory distinctions, certainly none approaching specific significance, to separate *E. bracteatum* H. & A. from *E. congestum* H. & A. It seems therefore that these plants, both resting on rather scrappy Uruguayan types collected by Tweedie, must be united under one or the other of their specific names. They were published on the same page. It would be natural to choose *E. bracteatum* which has a few lines of "priority of place," but the International Rules of Botanical Nomenclature, far from insisting upon the principle of priority of place, expressly indicate that when two groups of like nature are published at the same time the author subsequently uniting them may select whichever name seems best. In preferring, in this case, *E. congestum* to *E. bracteatum* the writer bases his choice on the grounds that *E. congestum* has been more frequently employed for the plant in question and is free from later homonyms, while the name *E. bracteatum* H. & A., which has scarcely been employed except in synonymy

since its original publication, conflicts with the subsequent homonym of Gardner. Of course the latter under the now validated rule rejecting later homonyms, could not be maintained, but as it has long been current in Brazilian taxonomy the introduction of a second even though earlier use of the name is undesirable since it would tend to confusion. It appears best therefore to select for the seemingly conspecific plant-entities *E. bracteatum* H. & A. and *E. congestum* H. & A. the name *E. congestum* H. & A., a designation which has not been applied to any other plant group.

E. (§ **Eximbricata**) **Skutchii**, spec. nov., fruticosum usque ad 3 m. altum; caule tereti densissime griseo-tomentello lenticellis sparsis ovalibus nigrescentibus vel atropurpureis ornato albo-medulloso; foliis oppositis longe petiolatis late ovatis acuminatis serratis basi rotundatis vel subcordatis paullo supra basin subpinnatim 5–7-nervatis textura membranaceis utrinque viridibus 8–10 cm. longis 6–8.5 cm. latis supra hirtellis subtus praecipue in nervis venisque pubescentibus, dentibus numerosis plerisque 1–2 mm. altis 3–4 mm. inter se distantibus saepe breviter cuspidatis; panicula terminali magna composita oppositiramea folioso-bracteata griseo-tomentella; pedicellis filiformibus usque ad 1 cm. longis cum bracteolis linearibus parvis instructis; capitulis 17–25-floris ca. 8 mm. longis 5–7 mm. diametro; involucri squamis 11–12 linearibus acutis ad apicem appendice filiformi 0.5–0.7 mm. longo auctis ca. 7 mm. longis 1.3 mm. latis tenuibus viridibus vel purpureis dorso laxe pilosis; corollis albis glabris; tubo proprio gracili 2.5 mm. longo; faucibus cylindratis 1.8–2 mm. longis; dentibus limbi 0.7 mm. longis; achaeniis gracilibus brunneis 2.2 mm. longis vix scabratis; pappi setis 18–21 delicatule capillaribus albis.—GUATEMALA: Dept. Chimaltenango: open hillside, Santa Elena, alt. 2400–2700 m., Mar. 25, 1933, *Dr. A. F. Skutch*, no. 337 (TYPE, in U. S. Nat. Herb., fragm. Gr.); also Chichavac, in pine woods; flowers white, very fragrant, Mar. 23, 1933, *Skutch*, no. 333 (U. S., Gr.).

When keyed among previously described Mexican and Central American species of the genus, this plant falls near *E. ixiocladon* Benth. and *E. subcordatum* Benth. From the former it may be readily distinguished by its grayish-tomentose stem and the absence of viscidity in the inflorescence; from the latter by its larger much more numerously toothed leaves, larger heads and conspicuous dark lenticels on its tomentellous stems.

In naming this species it is a pleasure to commemorate the botanical activities of Dr. A. F. Skutch, who has combined with his ornithological interests a careful attention to the plants of the regions he has

explored and whose specimens and field notes are in many cases exceedingly helpful.

E. (§ **Eximbricata**) **tarmense**, spec. nov., fruticulosum e caudice lignoso valde incrassato multicaule caespitosum; caulibus subsimplicibus vel paucirameis ca. 2 dm. altis glabris parte inferiori a delapsu foliorum saepius denudatis et nodulosis (internodiis plerisque 8–12 mm. longis) cortice griseo obtectis, parte media gracilibus brunneo-purpureis foliosissimis (internodiis brevissimis plerumque 2–5 mm. longis), parte suprema minus foliosis (internodiis 1–2.5 cm. longis); foliis parvis oppositis brevissime petiolatis (aliquando in axillis proliferis) anguste ovato-oblongis apice obtusis supra mediam partem paucicrenatis basi integris cuneatis utrinque glabris textura subcoriaceis subtus paullo pallidioribus et laxe reticulatis 5–8 mm. longis 2–3 mm. latis; petiolo vix 1 mm. longo; corymbis terminalibus 3–4-capitulatis; bracteis lanceolato-linearibus; pedicellis filiformibus usque ad 2 cm. longis; capitulis ca. 25-floris 1 cm. altis 7 mm. diametro; involucri squamis ca. 18 subaequalibus anguste oblongis obtusis tenuibus dorso striatis subglabris saepius purpureo-tinctis 4–5 mm. longis; corollis albis glabris, tubo proprio gracili 1.5 mm. longo; faucibus ca. 2 mm. longis; achaeniis nigris 2.2 mm. longis minute in angulis sursum scabratis; pappi setis ca. 15 tenuibus albis.—PERU: Dep. Junín: Tarma, on open hillside, alt. 3000–3200 m., Apr. 20–22, 1929, *Killip & Smith*, no. 21,833 (TYPE, in Gray Herb.).

In habit this approaches the Peruvian *E. Mancoanum* Robinson and the Colombian *E. Funckii* Robinson, but differs from the first in its glabrous instead of densely glandular-puberulent stems, narrower subglabrous phyllaries and slender black achenes, and from the second by its smaller heads and shorter blunter less petiolate leaves.

E. (§ **Subimbricata**) **Toroi**, spec. nov., fruticosum inflorescentia et summa parte caulis dense brunnescenteque puberulis exceptis subglabrum; caule tereti flexuoso; internodiis plerisque 1–5 cm. longis; foliis oppositis breviter sed graciliter petiolatis oblongo-lanceolatis acuminatis integris basi acutis vel obtusis margine revolutis penniveniis firmiter membranaceis post exsiccationem fusco-violaceis secum venas depressas sulcatis lucidulis subtus obscuris vix pallidioribus fusco-puncticulatis plerisque 4.5–7 cm. longis 1.8–2.6 cm. latis; petiolo ca. 1 cm. longo; panicula terminali subpyramidata 1.5 dm. longa 8 cm. diametro; capitulis ca. 6-floris 7.5 mm. longis 2.5 mm. diametro sessilibus in glomerulos ramulos terminantes arcte congestis; involucri subcylindrico-campanulati 5.5 mm. alti squamis ca. 16 regulariter 3–4-seriatim imbricatis persistentibus aetate divergentibus vix acutis vel obtusis vel apice (saepissime vinaceo)

rotundatis ciliatis dorso 3-striatis hirtellis 1.6–5.5 mm. longis 0.6–1.5 mm. latis; corollis gracilibus minute papillato-scabratis; tubo proprio et faucibus vix distinctis conjunctim ca. 4 mm. longis; dentibus limbi lanceolatis 0.5 mm. longis; achaeniis pallidis 1.8–2 mm. longis in angulis paullulo scabratis aliter laevibus; pappi setis ca. 30 albidis. —COLOMBIA: Dept. Antioquia: at Titiribi in the vicinity of Medellín, June 30, 1928, *Rafael A. Toro*, no. 1201 (TYPE, in herb. N. Y. Bot. Gard., phot. and fragm. Gr.). Though the much imbricated involucre might suggest reference of this species to § *Cylindrocephala*, the persistence and at length spreading habit of the phyllaries indicates its closer relationship with § *Subimbricata*, where its few-flowered heads, entire practically glabrous leaves, and rather unusual inflorescence should permit its ready recognition. It may be placed near *E. densum* Benth., which, however, has distinctly serrulate leaves rounded at the nearly sessile base and prominently reticulated beneath.

E. (§ **Cylindrocephala**) **trujillense**, spec. nov., fruticosum glaberrimum basi inclinans; caulibus teretibus purpurascentibus; internodiis plerisque 2–4 cm. longis; foliis oppositis lanceolatis vel anguste ovatis breviter petiolatis ad apicem versus integris attenuatis in lateribus acute 2–4-dentatis basi cuneatis textura firmiter coriaceis a basi 3-nervatis utrinque glaberrimis subconcoloribus supra lucidis (nervis venisque depressis) subtus opacis vel paullo lucidulis obscure albideque maculatis impunctatis; panicula terminali corymbosa oppositiramea 1–2 dm. alta aequilata foliaceo-bracteata glabra; pedicellis plerisque 1–5 mm. longis; capitulis ca. 25-floris 12 mm. longis 4–5 mm. diametro; involucri squamis ca. 30 pluriseriatim imbricatis arcte appressis ciliolatis 3-striatis et ad apicem versus viridi- vel brunneo-maculatis; corollis purpurascentibus glabris gracilibus ca. 5 mm. longis; achaeniis gracilibus glabris ca. 4 mm. longis; pappi setis ca. 28 albidis 4.5 mm. longis vix scabratis.—VENEZUELA: on arid slopes, Mendoza, Trujillo, Jan. 19, 1928, *Pittier*, no. 12,635 (TYPE, N. Y. Bot. Gard., phot. and fragm. Gr., isotypes U. S., Monac.).

This species, in its leathery, narrowly ovate to lanceolate, subsessile, somewhat bullate, shining leaves recalls *E. Thurnii* Robinson of the Roraima Mountains, but may be readily distinguished by its entirely glabrous character, broader phyllaries, and lack of the fine dark punctation evident on the lower surface of the leaves in *E. Thurnii*.

E. (§ **Cylindrocephala**) **Voglii**, spec. nov., ut videtur fruticosum erectum ramosum breviter sordideque tomentosum; ramis adscendentibus teretibus tomentulo purpureo-brunneo dense obtectis; internodiis superioribus ca. 3 cm. longis; foliis oppositis petiolatis ovatis acutiusculis crenato-dentatis vel subintegris basi rotundatis vel sub-

cordatis textura membranaceis supra puberulis subtus griseo-tomentellis a basi 3–5-nervatis reticulato-venosis 3–4.5 cm. longis 2–3 cm. latis; petiolo ca. 1 cm. longo; inflorescentia planiuscula corymbis subdensis ramos terminantibus; capitulis (vix maturis) 6–9 mm. longis 7–11-floris; involucri cylindrati squamis ca. 18 parvis adpressis basi subglabris eburneis 2–3-striatis ad apicem versus multo fuscioribus subherbaceis hispido-puberulis et glandulis sessilibus ornatis; squamis extimis et intermediis obtusis, intimis acutis plus minusve purpurascentibus; corollis sursum gradatim paullo ampliatis sine faucibus distinctis ca. 3 mm. longis extus glandulis adspersis; dentibus limbi ca. 0.3 mm. longis.—VENEZUELA: Timotes, *Father C. Vogl*, no. 764 (TYPE, in herb. Univ. of Munich, phot. and small fragm. Gr.).

This species differs from the somewhat similar *E. scabrum* L. f. in having smaller heads and much more appendiculate and puberulous phyllaries. Though in many respects similar to *E. meridense* Robinson, it has shorter subsessile heads, far more conspicuously dark-tipped phyllaries, and leaves of ovate instead of lanceolate form. From *E. Tyleri* Robinson, which has rather similar foliage, it differs in its dark-appendaged phyllaries, its shorter leaves abruptly rounded or even subcordate at base, and its relatively longer petioles.

E. (§ **Subimbricata**) **yungasense**, spec. nov., perenne subherbaceum vel verisimiliter plus minusve lignescens (basi ignota) puberulum elatum patenter ramosum; caule tereti brunnescenti flexuoso albo-medulloso 4 mm. diametro; internodiis inferioribus usque ad 17–19 cm. longis; foliis (supremis exceptis) oppositis graciliter petiolatis deltoideo-ovatis acuminatis crenato-dentatis basi cordatis ima a basi 3-nervatis utrinque viridibus subconcoloribus breviter puberulis textura molliter membranaceis plerisque 2–5 cm. longis et 1.5–4 cm. latis; petiolo 1–4 cm. longo; panicula laxa foliaceo-bracteata glandulari-puberula; bracteolis ultimis parvis lanceolatis; pedicellis filiformibus 4–18 mm. longis; capitulis ca. 24-floris 7.5 mm. altis 4.5 mm. diametro; involucri subturbinato-campanulati squamis ca. 3–4-seriatim imbricatis viridibus striato-nervatis, interioribus linearioblongis obtusis subglabris, extimis lanceolatis acutis dense puberulis; corollis ut videtur albis glabris; tubo proprio vix 0.8 mm. longo; faucibus cylindratis vix ampliatis 2.5 mm. longis; dentibus limbi deltoideis ca. 0.3–0.4 mm. longis; achaeniis glabris 1.7 mm. longis; pappi setis ca. 30 albis 3 mm. longis.—BOLIVIA: Nor-Yungas: subtropical region, alt. 1300 m., Millugnaya, December, 1917, *Dr. Otto Buchtien*, no. 4407 (TYPE, in Gray Herb.).

This plant has long lain at the Gray Herbarium among some

baffling puzzles put aside for closer study when time could be found for the purpose. It clearly resembled in many respects the little known *E. tamboense* Hieron. but careful examination renders it improbable that it is conspecific with that species, which has somewhat firmer rhombic-ovate and more sharply toothed leaves, fewer-flowered heads, lilac corollas and obtuse outer phyllaries.

In *E. yungasense* may be placed also *Buchtien* no. 300, collected at Sirupaya near Yonacachi in Sur-Yungas, though earlier tentatively referred by the writer (Contrib. Gray Herb. lxi. 53) to *E. tamboense*.

Mikania (§ **Thyrsigerae**) **acrensis**, spec. nov., volubilis inflorescentia inconspicue puberula excepta glaberrima; caule tereti; medulla alba; internodiis superioribus plerisque 4–6 cm. longis; foliis oppositis breviter graciliterque petiolatis ellipticis vel elliptico-ovatis acuminatis integris a basi 3–7-nervatis membranaceis utrinque viridibus glabris tenuiter prominulenterque reticulatis 4–5 cm. longis 2.4–2.8 cm. latis (supremis solis visis); petiolo ca. 1 cm. longo; panicula pyramidata 4–5 dm. alta 2.5–3 dm. diametro composita oppositiramea foliaceo-bracteata; ramulis plus minusve ancipitibus obscure hirtellis; pedicellis 0–3 mm. longis; bracteolis late ovatis acutis vel acuminatis 4 mm. longis 2.5–3 mm. latis tenuibus viridibus glabris vel glabriusculis; capitulis numerosis ca. 1 cm. longis; involucri squamis oblongis obtusis brevissime mucronulatis pallido-viridibus ca. 6 mm. longis ad apicem versus eroso-subciliatis dorso glabris leviter striatulis; corollis albis glabris; tubo proprio ca. 2.5 mm. longo; faucibus brevissimis campanulatis; lobis limbi anguste lanceolatis ca. 2 mm. longis; styli ramis filiformibus; achaeniis glabris deorsum attenuatis 3.7 mm. longis; pappi setis ca. 60 rufescentibus 5 mm. longis corollas paullo superantibus.—BRAZIL: Seringal San Francisco on the Rio Acre, June 1911, *E. Ule*, no. 9883 (TYPE, in herb. Royal Gardens, Kew, phot. and small fragm. Gr.).

Presumably this species is related to the little known *M. Lindleyana* DC. of the Guianas, but that is said to have ovate leaves and oval-oblong bractlets equalling the phyllaries.

M. (§ **Thrysigerae**) **additicia**, spec. nov., herbacea scandens gracilis; caule tereti purpureo-brunneo dense breviterque piloso albomedulloso; internodiis 10–18 cm. longis; foliis oppositis longe petiolatis late ovatis acuminatis grosse dentatis utroque lateraliter 1(–2)-angulatis basi cordatis ima a basi 3(–7)-nerviis utrinque viridibus et parce hirtellis subtus paullo pallidioribus textura membranaceis pellucide reticulatis 6–8 cm. longis et latis; petiolo 3–5 cm. longo dense puberulo; paniculis griseo-pubescentibus pedunculatis plerisque 4–6 cm. diametro, axillaribus oppositis et terminali conjunctim in-

florescentiam elongatam foliaceo-bracteatam formantibus; capitulis pedicellatis; bracteolis ovato-lanceolatis acutis viridibus ca. 2 mm. longis; involucri squamis oblanceolato-oblongis subacutis viridibus tenuibus griseo-perberulis vix nervatis ca. 4 mm. longis; corollis glabris albis; tubo proprio gracili 0.8 mm. longo; faucibus campanulatis ca. 2 mm. altis; dentibus limbi deltoideis 0.5 mm. longis; achaeniis (immaturis) vix scabratis ca. 2.2 mm. longis; pappi setis 20–25 albis inaequalibus.—BRAZIL: State of Rio de Janeiro: Serra Itatiaya, a small herbaceous vine in woods, alt. 2100 m., May 17, 1922, *Holway*, no. 1856a (TYPE, in Gray Herb.). Collected and distributed with *M. stenomeres* described below.

M. (§ THYRSIGERAE) ANTIOQUIENSIS Hieron. in Engl. Bot. Jahrb. xxviii. 580 (1901). The original material of this silky-stemmed cordilleran liana had ovate leaves with cordate or rounded base. The following plant of recent collection seems certainly conspecific but has leaves sufficiently different in contour to justify recognition as a new variety.

Var. **subcuneata**, var. nov., foliis ovato-oblongis basi plus minusve cuneato-angustatis; aliter var. *typicae* similis.—PERU: "vine, climbing tangle, in open," sandy soil along trail from Iquitos to San Juan, alt. 105 m., flowers white, Feb. 7, 1932, *Mrs. Ynes Mexia*, no. 6492 (TYPE, in Gray Herb.).

M. Bradei, spec. nov., gracilis volubilis; caule tereti brunneo breviter piloso; pilis tenuibus flexuosis sub lente moniliformibus purpureo-nodulosis; internodiis 7–15 cm. longis; foliis oppositis graciliter petiolatis suborbiculari-ovatis obtusis subintegris vel plerumque plus minusve undulato-crenatis basi cordatis textura firme membranaceis supra subglabris (venulis impressis) subtus canescente tomentellis (venulis prominulentibus) 2.5–4 cm. longis 2.5–3.5 cm. latis; petiolo 1–1.5 cm. longo; corymbis axillaribus valde convexis paucicapitulatis 3–5 cm. diametro basi foliaceo-bracteatis; pedicellis 0–3 mm. longis; bracteolis lanceolatis ca. 3 mm. longis; capitulis ca. 9 mm. longis; involucri squamis elliptico-oblongis obtusis saepius brunnescentibus vel purpureo-tinctis dorso pilosis tenuibus 5.5 mm. longis; corollis albis glabris; tubo proprio gracili 2.5 mm. longo; faucibus vix ullis; lobis limbi ovato-oblongis obtusis 1.8 mm. longis 2-nervatis; achaeniis glabris 3.4–3.7 mm. longis; pappi setis ca. 70 salmoneis ca. 4.5 mm. longis.—BRAZIL: Jaragua, São Paulo, Mar. 30, 1913, *Brade*, no. 6101 (TYPE, in Gray Herb.).

In habit this species somewhat approaches *M. phaeoclados* Mart., but can be readily separated by its thinner relatively broader merely undulate-crenate and longer-petioled leaves, much looser inflorescence, and pilose phyllaries.

The number on the label of the specimen is apparently not that of the collector but of its record in the herbarium of the Biological Institute at São Paulo. It is a pleasure to name this new plant for its discoverer, Mr. A. C. Brade, who has for many years been active in the botanical exploration of his country. This species is probably best referred to § *Corymbosae* though the inflorescence is rather looser and more convex than is usual in that section.

M. (§ **Thyrsigerae**) **calcarulata,** spec. nov., verisimiliter frutescens vel frutescens et volubilis (basi ignota); caule tereti dense hirtello albido-medulloso; foliis oppositis petiolatis membranaceis ovatis vel oblongo-ovatis acutiusculis vel (saltim supremis) acuminatis profunde sinu angusto vel etiam clauso cordatis ad basin versus paullo denticulatis aliter integris vel obscure undulatis a basi trinervatis supra minute puberulis post exsiccationem olivaceis subtus multo pallidioribus molliter griseo-tomentellis ca. 10 cm. longis et 6 cm. latis; petiolo ca. 2.5 cm. longo; thyrso subcylindrato 2–2.5 dm. longo 9–10 cm. diametro, ramis oppositis late patentibus usque ad mediam partem simplicibus et nudis; ramulis 3–10 mm. longis plerisque 3-capituliferis; bracteolis ultimae ordinis ovato-ellipticis sessilibus integris acutiusculis plerisque 4–6 mm. longis; capitulis subsessilibus ca. 11 mm. longis; involucri squamis late oblanceolatis acutis striatis viridibus vel paullo purpureo-tinctis obscure hirtellis basi calcarulatis ca. 7 mm. longis 2.5 mm. latis; corollis ut videtur albis ca. 7 mm. longis; achaeniis (immaturis) 2.5 mm. longis; pappi setis ca. 75 albis corollas aequantibus.—PARAGUAY: on plateau and slopes of the Sierra Amambay, *Rojas*, no. 10,548 (TYPE, in herb. Univ. Gen., phot. and small fragm. Gr.) being of the series issued by Dr. E. Hassler.

Prolonged effort has failed to place this rather characteristic plant in any of the other now fairly numerous Mikanias thus far recorded from Paraguay, nor has it been possible to refer it satisfactorily to any species known to the writer from any of the neighboring countries.

The deep and sometimes closed basal sinus of the otherwise subentire leaves, their strongly discolorous character with grayish-velvety lower surface, the cylindrical inflorescence with subsessile heads clustered rather closely toward the outer ends of the panicle-branches, the elliptic-ovate bractlets and curiously spurlike bases of the phyllaries should make this species relatively easy of recognition. Though sufficient to demonstrate most of the characters, the type material is unfortunately scanty.

The name alludes to the short spurlike appendage at the base of the phyllary.

M. (§ **Thrysigerae**) **camporum**, spec. nov., volubilis herbacea;

caule subtereti (post exsiccationem costulato) conspicue patenterque setifero albo-medulloso vix vel haud fistuloso; internodiis 4–15 cm. longis; foliis oppositis petiolatis triangulari-ovatis caudato-acuminatis dentatis basi sinu angusto vix profundo cordatis lateraliter argute angulatis supra etiam post exsiccationem laete viridibus subglabris subtus paullo pallidioribus in nervis venisque setiferis plerisque 8–10 cm. longis et latis textura membranaceis; petiolo 2.5–4 cm. longo setigero; paniculis axillaribus pyramidatis 5–18 cm. longis 6–9 cm. diametro sordide subappresseque pilosis; bracteolis oblongis albido-scariosis acutiusculis involucrum longitudine aequantibus vel paullo superantibus; capitulis ca. 8 mm. longis; pedicellis plerisque 2–5 mm. longis; involucri squamis albido-scariosis ca. 7 mm. longis et 1.2–1.4 mm. latis linearibus plus minusve acutatis tenuibus subglabris; corollis glabris albis; tubo proprio gracili ca. 2 mm. longo; faucibus campanulatis ca. 1 mm. altis; dentibus limbi deltoideo-ovatis; achaeniis fusco-griseis glabris 2.8 mm. longis; pappi setis albis corollam longitudine subaequantibus.—BRAZIL: State of São Paulo: Campos do Jordão in woods, alt. 1800 m., *E. W. D. and M. M. Holway*, no. 1766 (TYPE, in herb. Univ. Minn., isotype Gr.).

Traced by Baker's key to the Mikanias in the Flora Brasiliensis this plant would be at once referred to § *Angulatae* and presumably placed near *M. triangularis* Bak., a species of some habital similarity but quite glabrous throughout, tending to be nigrescent in drying, and having bractlets less than half as long as the phyllaries. *M. camporum* is also in some respects similar to the still rather obscure *M. vitifolia* DC., but that has longer-petioled 5–7-lobed or -angled finely cuspidate-denticulate leaves, a longer proper tube of the corolla, a fistulose stem and sparser shorter and much less setiform pubescence.

M. (§ **Corymbosae**) **capricorni**, spec. nov., gracilis volubilis ut videtur herbacea vel suffruticosa (basi ignota); caule flexuoso tereti primo pilis purpureo-brunnescentibus moniliformibus patentibus induto; internodiis plerisque 7–9 cm. longis; foliis oppositis graciliter petiolatis triangulari-ovatis acuminatis crenato-dentatis basi integris subtruncatis vel subcordatis membranaceis supra viridibus parcissime hirtellis subtus paullo pallidioribus parce (solum in nervis venisque) hirtis ca. 3 cm. longis et 2.5–3.2 cm. basi latis; corymbis subdensis planiusculis; capitulis pedicellatis ca. 1 cm. longis; involucri squamis oblongis acutis stramineo-olivaceis textura medio subherbaceis ad marginem versus subscariosis dorso obsolete puberulis ca. 7.5 mm. longis et 2–2.2 mm. latis; corollae tubo proprio 2.5 mm. longo; faucibus turbinato-campanulatis ca. 1.5 mm. altis; dentibus limbi deltoideis acutis ca. 1.5 mm. longis ad apicem solum hispidulis; achaeneis

gracilibus glabris 4 mm. longis in angulis minutissime serrulatis; pappi setis ca. 75 albis.—BRAZIL: campo, San José dos Campos, State of São Paulo, Aug. 1908, *Alberto Löfgren*, no. 258 (TYPE, in Mus. Stockholm, phot. and small fragm. Gr.).

This species somewhat recalls *M. salviaefolia* Gardn. and the maritime *M. stipulacea* (Vahl) Willd., but both of these have rufescent pappus and larger leaves, which are much more densely pubescent, in fact white-woolly or shortly white-velvety on the lower surface.

M. (§ **Thyrsigerae**) **Chaseae**, spec. nov., herbacea volubilis perennis brevissime atro-pilosa post exsiccationem fusco-brunnea; caulibus 2–3 gracilibus teretibus atropurpureis a basi ad apicem foliosis 2.5 mm. diametro ca. 7 dm. altis; internodiis plerisque 3–7 cm. longis; foliis oppositis graciliter petiolatis deltoideo-ovatis acuminatis serrato-dentatis basi cordatis lateraliter utroque 1(–2)-angulatis utrinque hirtellis a basi 3(–5)-nervatis plerisque 3.5–4.5 cm. longis et 3–4 cm. latis textura membranaceis; panicula terminali composita elongata foliaceo-bracteata pilis brevissimis incurvis fusco-brunneis puberula; bracteolis lineari-lanceolatis vel oblongis 2–3 mm. longis; pedicellis filiformibus 2–5 mm. longis; capitulis (immaturis) ca. 5 mm. longis; involucri squamis lineari-oblongis obtusis brunneis obscure nervatis ca. 4 mm. longis; corollis gracilibus ut videtur sine faucibus distinctis; dentibus limbi brevibus; pappi setis laete albis sublaevibus. —BRAZIL: Minas Geraes: Serra do Caparaó, twining on brush in the turfy campo above the timber line and near the rest house, alt. 2100–2200 m., Apr. 30–May 4, 1925, *Mrs. Agnes Chase*, no. 9687 (TYPE, in Gray Herb.).

Traced by Baker's key in the Flora Brasiliensis this species would fall in the Series *Angulatae* near *M. vitifolia* DC. from which, of course, it is readily distinguished by its much smaller deltoid-ovate conspicuously dentate leaves, much more leafy and less glomerate inflorescence, smaller heads, etc.

It is a pleasure to name this species for its discoverer, Mrs. Agnes Chase, whose diligence in collecting and observing the grasses by no means prevented her from much useful collecting in other groups during her strenuous explorations in Brazil.

M. (§ **Thyrsigerae**) **eriostrepta,** spec. nov., perennis volubilis griseo-lanata; caule tereti lano griseo subsericeo reflexo induto; internodiis 1–1.5 dm. longis; foliis oppositis petiolatis ovato-oblongis ad apicem acute cuspidatum gradatim angustatis paullo undulatis et obscure remoteque cuspidato-denticulatis basi brevissime cordatis a basi 3–5-nervatis supra villosis subtus laxe griseo-lanatis 9–11 cm. longis 4–5 cm. latis membranaceis; petiolo lanuginoso ca. 2.5 cm.

longo; paniculis terminalibus et in axillis superioribus oppositis pedunculatis oppositirameis 8–9 cm. longis 4–6 cm. diametro; capitulis pedicellatis; bracteolis oblongis scariis brunnescentibus subglabris involucrum paullo superantibus; involucri squamis lanceolato-linearibus brunnescente substramineis ad apicem acutiusculum versus paullo hirtellis aliter glabris striato-nervatis; corollis albis glabris; tubo proprio gracile 2 mm. longo; faucibus campanulatis 1 mm. longis; dentibus limbi ovato-deltoideis 1 mm. longis; achaeniis 2.8–3 mm. longis deorsum attenuatis; faciebus nigrescentibus atomiferis; angulis pallidis; pappi setis 20–30 albis.—BRAZIL: Alto da Serra, São Paulo, Trepadeira, 22 Aug. 1925, *Dr. F. C. Hoehne*, no. 20,895 (TYPE, in Gray Herbarium).

The type (somewhat overmature) shows this plant to be a rather close relative of *M. hirsutissima* DC. However it differs markedly in the close white woolly indument of its stem as well as in the facts that its leaves are nerved from the base, rather than pinnately nerved, and completely lack the prominulent reticulation characteristic of *M. hirsutissima.* There seems no doubt that it is a different species. Similarly it rather closely approaches *M. lanuginosa* DC. but that has relatively broader ovate and much more deeply cordate leaves. When better known *M. eriostrepta* may possibly be found to intergrade with one or the other of these species but no such transition is as yet apparent.

M. (§ THYRSIGERAE) FERRUGINEA Rusby ex Buchtien, Fl. Boliv. i. 190 (1910); Robinson, Contrib. Gray Herb. lxiv. 101 (1922). This species, almost always covered as to its stem and petioles with wide spreading almost setiform tawny hairs, appears to pass to a nearly smooth somewhat narrower leaved variety, which may be put on record as follows:

Var. **subglabra**, var. nov., ab. var. *typica* patenter fulvo-piloso differt caule petiolisque glabris vel obsolete hirtellis; foliis ovato-oblongis basi rotundatis integerrimis triplo-reticulatis; costa et venis primae et secundae et tertiae ordinis utroque exsertis; habitu, inflorescentia, capitulis var. *typicae* similis.—BOLIVIA: Mapiri Region at San Carlos, alt. 850 m., May 24, 1927, *Buchtien*, no. 1576 (TYPE, in Gray Herb., isotype U.S.).

M. (§ **Corymbosae**) **Hoehnei**, spec. nov., volubilis primo aspectu glaberrima; caulibus teretibus purpureo-brunneis; internodiis 8–15 cm. longis; foliis oppositis graciliter petiolatis caudato-acuminatis subhastato-cordatis utroque latere obtuse angulatis aliter integris vel paullo undulatis a basi 5–7-nervatis textura herbaceis (aut paullo carneis) supra glabris subtus saltim juventate minutissime lepido-

furfuraceis plerumque 3–6 cm. longis 2.5–4 cm. latis; petiolo 1.8–4 cm. longo; corymbis parvis (2–2.5 cm. diametro) valde convexis; pedicellis plerisque 1–6 mm. longis; bracteolis magnis conspicuis late ovatis acutis sessilibus involucrum superantibus, ad apicem versus obsolete hirtellis; involucri squamis lineari-oblongis obtusis rubescenti-brunneis ad apicem versus brevissime ciliatis 5.5–6 mm. longis; corollis roseis glabris; tubo proprio gracili 2.5 mm. longo; faucibus companulatis 1.5 mm. longis; dentibus limbi deltoideo-lanceolatis 1.5 mm. longis; achaeniis gracilibus 5 mm. longis ad summum versus paullo glandulari-atomiferis aliter glabris; pappi setis ca. 50 salmoneis ca. 4.5 mm. longis.—BRAZIL: Japuhyha, São Paulo, 17 Apr. 1926, *Hoehne & Gehrt*, no. 17,376 (TYPE, in Gray Herb.). Without data, *Riedel* (Gr.).

This well marked species when secured by Riedel was referred incorrectly to *M. testitudinaria* DC. and distributed under that name from the St. Petersburg Botanical Garden. This determination (probably in the first place made by Schultz seems to have been accepted by Baker, who records a Riedel specimen under *M. testitudinaria* in the Flora Brasiliensis. However, the real *M. testitudinaria* DC., as shown by its type, Vauthier's no. 330, is a perceptibly puberulent plant with shorter, stouter petioles and very much smaller bracteoles, scarcely more than a quarter as long as the phyllaries. It is a pleasure to name this species for Dr. F. C. Hoehne, whose contributions to the knowledge of Brazilian botany have been of distinguished extent and interest.

M. (§ **Spiciformes-Thyrsigerae**) **infesta**, spec. nov., lignosa scandens breviter scabrido-pilosa; caule tereti post exsiccationem costellato dense recurvato-setulosis; foliis oppositis petiolatis oblongis acutis vel subacuminatis cuspidato-denticulatis basi rotundatis vel (foliis supremis) breviter cuneatis usque ad mediam partem pinnativeniis supra scaberrimis impresse reticulato-venulosis subtus breviter sordideque pubescentibus prominulenter reticulato-venulosis textura primo membranaceis aetate subrigidis 12–20 cm. longis 5–7 cm. latis; petiolo robusto 2–3 cm. longo; panicula terminali ovoideo-pyramidata oppositiramea breviter setuloso-pilosa 3 dm. longa 1.5 dm. diametro; capitulis 5–6 mm. longis sessilibus approximatis prope apices paniculae ramulorum spicatis; bracteolis lanceolatis 1.5 mm. longis; involucri squamis anguste ovato-oblongis brunneis apice rotundatis dorso parce puberulis 4 mm. longis; corollae tubo (ca. 1.8 mm. longo) faucibusque viridescente albis; dentibus limbi roseis; styli ramis albis; pappi setis ca. 25 albis.—PERU: Dept. Junín: Pichis Trail, Yapas, alt. 1350–1600 m., in dense forest, June 28–29, 1929, *Killip & Smith*, no. 25,439 (TYPE, in U. S. Nat. Herb., phot. and fragm. Gr.).

The heads in this species, though sessile along the secondary branches of the panicle are borne so near the tips of these that the spicate arrangement is somewhat less noticeable than in most species of § *Spiciformes*, to which, however, the plant would seem technically referable. It may be placed next *M. Jelskii* Hieron. from which it may be readily distinguished by its much larger leaves, which are scabrous and have the veinlets impressed on the upper surface, and are pinnately nerved from near the base, also by its much more crowded heads, as well as by other features.

The type specimen, a unicate in the collection, bears on the inflorescence many subcylindric costulate tubular growths of irregular disposition, widely spreading and open and somewhat slit at the outer end. These, although of vegetable tissue connected with the plant, stand in no relation to its morphology and are inferred to be galls caused by Cecidomyids. The plant does not appear to be otherwise deformed and its inflorescence, heads, and florets seem to be quite normal.

M. (§ **Thyrsigerae**) **iquitosensis**, spec. nov., lignosa scandens exsiccatione fuscescens; caule subtereti costulato puberulo; internodiis plerisque 3–4 cm. longis; foliis oppositis graciliter breviterque petiolatis oblongis acutis vel acuminatis integerrimis basi acutis utrinque glabris textura verisimiliter subcarnoso-membranaceis 4–6.5 cm. longis 2–3 cm. latis multo supra basin pinnatim 5-nervatis; petiolo 5–8 mm. longo puberulo; panicula elongata folioso-bracteata; partialibus patentibus plerisque 5–9 cm. longis sordide puberulis ramosis; bracteolis lanceolato-linearibus minutis; pedicellis ca. 2 mm. longis; capitulis 6–7 mm. longis ad apices ramulorum irregulariter cymosis; involucri squamis anguste lanceolato-linearibus acutis vel ad apicem obtusiusculum pilulosum plus minusve angustatis 4.5 mm. longis subenervatis non punctatis; corollis glabris; tubo proprio gracili 1.8 mm. longo; faucibus turbinato-campanulatis 2 mm. altis; dentibus limbi deltoideis acutis incurvis 1 mm. longis; achaeniis atrobrunneis parce puberulis 3 mm. longis; pappi setis ca. 40 albis.—PERU: Dept. Loreto: Iquitos, alt. about 100 m., in woods, corollas and styles greenish-white, Aug. 3–11, 1929, *Killip & Smith*, no. 27,080 (TYPE, in Gray Herb.).

This plant somewhat recalls the Colombian *M. Aschersonii* Hieron. but has smaller much less clearly reticulated leaves as well as linear-lanceolate acute or acutish undotted and almost nerveless phyllaries, shorter corolla-throat, relatively longer proper tube and limb, as well as other differences.

M. (§ **Spiciformes**) **Klugii**, spec. nov., scandens primo aspectu

glabra sed saltim inflorescentia sordide denseque breviter puberula; caule subtereti costulato fistuloso purpureo-brunneo puberulo; internodiis 7 cm. vel ultra longitudine; foliis oppositis graciliter petiolatis late ovatis cuspidato-acuminatis subintegris (margine plus minusve revolutis et undulatis) basi rotundatis textura subcoriaceis utrinque prominulenter reticulatis supra glabris lucidis post exsiccationem fuscescentibus subtus pallidioribus obscuris in nervis inconspicue puberulis ca. 10 cm. longis 5–7 cm. latis; panicula magna laxa patenter ramosa 3–4 dm. alta 2.5–3 dm. diametro basi foliaceo-bracteata; ramis inflorescentiae plerisque usque ad mediam partem simplicibus nudis; ramulis plerisque 3–7 cm. longis; capitulis 7–8 mm. longis in spicas laxas plerumque binatim vel ternatim dispositis sessilibus vel breviter pedicellatis; bracteolis minimis lanceolato-linearibus 1–1.5 mm. longis; involucri squamis linearibus obtusis 4.5–5 mm. longis 0.8–1 mm. latis sordide puberulis post exsiccationem atrobrunneis; corollis subglabris post exsiccationem fusco-brunneis, tubo proprio gracili 2.2 mm. longis, faucibus anguste campanulatis 1.2 mm. altis, dentibus limbi ovatis acutis; achaeniis (immaturis) 1.8 mm. longis in angulis paullo scabratis; pappi setis ca. 30 carneis corollas subaequantibus vel paullo superantibus.—PERU: Dep. Loreto: a liana in dense forest, Florída, Rio Putumayo, at mouth of Rio Zubenita, alt. about 180 m., May–July, 1931, *G. Klug*, no. 2135 (TYPE, in Gray Herb.); Balsapuerto, alt. 220 m. in forest, Mar. 1933, *G. Klug*, no. 2960 (Gr.).

Of the Peruvian species of *Mikania* thus far described, this probably approaches most nearly *M. aquaria* Robinson, but it differs in having shorter-petioled leaves, which are subglabrous beneath, and somewhat prominently reticulated veinlets on both leaf-surfaces, while in *M. aquaria* the veinlets are impressed above and the lower leaf-surface is densely puberulent throughout. In *M. aquaria* the phyllaries are thinner, more distinctly nerved and nearly glabrous dorsally.

Among the Brazilian species, the closest approach to *M. Klugii* would probably be found in *M. amazonica* Baker but this is described as having rigidly subcoriaceous leaves with immersed and obscure veinlets, its phyllaries being but 2 mm. long and dorsally glabrous.

According to the collector's note *M. Klugii* is called *Si-ey-mano* by the Huitoto Indians.

M. (§ **Thyrsigerae**) **Lawrancei,** spec. nov., scandens fruticosa 3–4 m. longa; caule subtereti primo patenter piluloso vel incurvo-puberulo et glandulis sessilibus globosis aetate nigrescentibus ornato albo-medulloso; internodiis ca. 3 cm. longis; foliis oppositis brevissime petiolatis oblongis acuminatis integris vel obscurissime remoteque

denticulatis basi cordatis pinnati-nervatis utrinque delicatule reticulatis 6.5–10 cm. longis 1.7–3.5 cm. latis firmiter membranaceis supra in costa minutissime puberulis aliter glabris sublucidis subtus paullo pallidioribus pubescentibus et cum glandulis sessilibus nigris ornatis; paniculis terminalibus et lateralibus ca. 1.5–2 dm. longis et 5–12 cm. diametro oppositirameis; capitulis subsessilibus glomerulatis ca. 6 mm. longis; bracteolis ovatis acutis sparse puberulis involucro brevioribus; involucri squamis oblongis sparse puberulis apice rotundatis brunnescenti-stramineis 3.2 mm. longis 1 mm. latis; corollis sordide albis; tubo proprio gracili 0.8–1 mm. longo; faucibus subcylindrato-campanulatis 1.5 mm. altis; dentibus limbi deltoideis ca. 0.6 mm. longis subglabris vel ad summam partem versus paullo puberulis; pappi setis ca. 30 albis.—COLOMBIA: Dept. Boyaca: high forest front, Alto Chapon region, alt. 2135 m., *A. E. Lawrance*, no. 413 (TYPE, in Gray Herb., isotype in Field Mus.).

This species does not appear closely related to any of the hitherto described Colombian Mikanias of § *Thyrsigerae*. It may best be placed near *M. Stuebelii* Hieron., from which, however, it may be readily distinguished by its very short petioles and by its reticulated, cordate and gland-sprinkled leaves.

M. LINDBERGII var. COLLINA Bak. in Mart. Fl. Bras. vi. pt. 2, 233 (1876). From this obtusish-leaved, obscurely puberulent phase of *M. Lindbergii* Bak., founded on Regnell, no. III. 717 (in part), the writer fails to find any significant or reliable character to separate *M. nitidula* Bak. l. c. 243, as shown by the original material in the herbarium of the Royal Botanic Gardens at Kew, namely Warming's specimen from Lagoa Santa and Ackermann's also from the Brazilian state of Minas Geraes, where *M. Lindbergii* with some variation of leaf-contour appears to be a characteristic plant of frequent occurrence.

M. (§ **Thyrsigerae**) **malacolepis**, spec. nov., ut videtur perennis et scandens basi ignota; caule ramisque teretibus pallide brunnescenti-tomentellis; internodiis plerisque 4–8 cm. longis; foliis oppositis graciliter petiolatis ovatis acuminatis integris cordatis a basi 5-nervatis membranaceis supra puberulis subtus dense pallideque pubescentibus; panicula terminali 17–24 cm. alta ca. 8 cm. diametro subdistanter oppositiramea; capitulis ca. 9 mm. longis crassiusculis breviter pedicellatis; bracteolis late ovatis vel suborbicularibus magnis 4–4.5 mm. longis 3 mm. latis pallide fulvescenti-sericeis; involucri squamis late oblongis obtusissimis saltim ad apicem versus etiam fulvescenti-sericeis 4.5–5 mm. longis 2 mm. latis; corollae tubo proprio 2.5 mm. longo; faucibus subcampanulatis 1.5 mm. longis; dentibus limbi 0.7 mm. longis; achaeniis glabris 3 mm. longis; pappi setis ca. 45 albidis.—

Brazil: Minas Geraes: Lagoa Santa, *Warming* (type, in Gray Herb.); Caldas, 6 Sep. 1862 (hb. Inst. Biol. S. Paulo, where numbered 20,790).

When traced by the key in the Flora Brasiliensis this falls into *M. vismiaefolia* and in fact it corresponds well with Baker's description of that species, having cordate leaves and large bractlets. Indeed it is to be noticed that a plant of Regnell and one collected by Warming at Lagoa Santa are included by Baker in *M. vismiaefolia*. However, the real *M. vismiaefolia* DC. Prod. v. 189 (1836) was based on the very different *Vauthier* no. 267 of which no less than three specimens have been examined and which entirely confirms DeCandolle's description since it has leaves obtuse not at all cordate at base, inflorescence more subdivided, bractlets minute, and phyllaries much narrower.

It may be remarked that *M. vismiaefolia* was placed by DeCandolle in his § *Erectae* on the doubtful assumption that it was not a twiner. Baker, on the other hand, referred it to Series *Cordiformes*. However, it is presumably a member of the Series *Ecordatae* and may appropriately be placed next *M. nodulosa* Sch.-Bip., which is closely similar in nearly all respects, though described as having leaves glabrous above, which is by no means the case with *M. vismiaefolia*.

M. (§ **Corymbosae**) **panamensis**, spec. nov., volubilis gracilis obscure puberula; caule subtereti multicostulato purpurascenti; foliis parvis oppositis graciliter petiolatis deltoideis argute acuminatis utroque 3–4-crenato-lobulatis cordatis pallide viridibus membranaceis utrinque puncticulatis plerisque 1.5–3 cm. longis 1.2–2.4 cm. latis ima a basi 3-nervatis; corymbis in ramis terminalibus breviter pedunculatis 2–3 cm. diametro planiusculis; bracteolis lanceolatis minimis; capitulis ca. 4.5 mm. longis sessilibus vel breviter pedicellatis; involucri squamis subspatulato-oblongis viridescenti-albidis incurvo-puberulis (etiam glandulis aureo-brunneis sessilibus ornatis) 3.5–4 mm. longis maturitate ad apicem obtusissimum vel rotundatum lasiohirtellis; corollis albis ca. 3.2 mm. longis; tubo proprio 1 mm. longo; faucibus gradatim turbinatis ca. 2 mm. altis; dentibus limbi deltoideis ca. 0.3 mm. longis; achaeniis (vix maturis) 1–1.2 mm. longis glabris; pappi setis ca. 30 tenuibus albis corollam subaequantibus.—Panama Canal Zone: around Culebra, alt. 50–150 m., Jan. 2, 1911, *Pittier*, no. 2191 (type in U. S. Nat. Herb., phot. and fragm. Gr.).

In its habit and small deltoid coarsely toothed cordate leaves, this species recalls the Cuban *M. batatarfolia* DC., which however has nearly glabrous acute to shortly acuminate phyllaries. From *M. congesta* DC. (including *M. Parkeriana* DC. and *M. variabilis* Gardn.) the plant here described differs in its smaller leaves and particularly

its inconspicuous bractlets which are scarcely a third as long as the phyllaries, while in *M. congesta* DC. they are conspicuous and equal or often exceed the phyllaries. On the whole *M. panamensis* approaches perhaps most closely some of the forms of *M. periplocifolia* H. & A., an abundant and variable species of extra tropical South America, but that has a perceptibly different inflorescence with the heads more glomerately grouped in the rather dense corymbs. It also has pretty conspicuous bractlets often nearly or quite as long as the phyllaries.

It is remarkable that this striking and graceful little plant, collected near the famous and much visited Culebra region does not seem to have been secured by any other collector than Professor Pittier.

M. PANICULATA DC. Prod. v. 194 (1836). Baker in Mart. Fl. Bras. vi. pt. 2, 240 (1876), probably misled by Schultz's incorrect determination of Riedel's no. 552, seems to have wholly misapplied the name *M. paniculata*. DeCandolle's original description calls for a plant with heads spicately and rather distantly disposed along the branchlets of a loosely much branched panicle, and the type, collected by Lund (Gen., phot. Gr.), clearly shows such an inflorescence with sessile or subsessile spicately arranged heads and linear-oblong phyllaries which are slightly thickened and perceptibly calcarulate at the base.

Baker, on the other hand, used the name *M. paniculata* DC. to cover not only the Lund specimen (which he cannot have seen or at least cannot have carefully examined) but two other plants of quite different nature, with heads glomerulate in thyrsoid inflorescences and with elliptic-oblong phyllaries not noticeably calcarulate at base. These extraneous elements in Baker's treatment are 1) *Burchell*, no. 4774 (with crisped-puberulent and shortly villulose very flexuous slender stems and subsessile heads), which is M. BRUNNESCENS Robinson, Contrib. Gray Herb. lxxvii. 48 (1926), and 2) *Riedel*, no. 552 (with much stiffer, straighter, nearly glabrous stems and slender-pedicelled heads), which seems to fall satisfactorily into M. GUILLEMINII Robinson, Contrib. Gray Herb. xcvi. 26 (1931).

M. paniculata var. *melastomaefolia* Sch.-Bip. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 240 (1876) is a plant represented in the herbarium of the Royal Botanic Gardens at Kew only by some fragments of Warming's no. 274, thus labelled in hand of Baker. These show a single leaf, which is oblong-lanceolate, glabrous, petiolate, 3-nerved from near the base and not significantly different either in form or texture from the leaves of *M. Guilleminii*. With the leaf is a portion of an inflorescence, which likewise corresponds rather closely as to

phyllaries, etc., with *M. Guilleminii*. The only difference observed was that in the Warming fragment the penultimate heads on the panicle-branchlets are subsessile, while in the other material available of *M. Guilleminii* they are more distinctly pedicelled. From the form and texture of the phyllaries, as well as from their lack of any perceptible calcarulate base, it seems clear that this var. *melastomaefolia* should not be placed under *M. paniculata* DC. Notwithstanding the slight tendency it exhibits toward a subspicate disposition of the heads on the panicle-branchlets, it corresponds with *M. Guilleminii* in so many details that until better known it may probably be best treated as a doubtful synonym of that species.

M. (§ THRYSIGERAE) PHAEOCLADOS Mart. Fl. Bras. vi. pt. 2, 256 (1876). A plant, in many respects, so closely agreeing with this species that it seems pretty certainly conspecific may be distinguished from the typical variety as follows:

Var. **typica** foliis ovatis obtusis vel acutis nullo modo attenuatis supra scaberrimis plerisque 3–5 cm. longis exsiccatione brunneo-fuscescentibus textura duriusculis.

Var. **macrophylla**, var. nov., foliis lanceolato-ovatis acuminato-attenuatis supra vix scabridis plerisque 8–10 cm. longis post exsiccationem viridibus vel olivaceis textura primo mollibus aetate leviter induratis.—BRAZIL: Minas Geraes, at Araponga in the Serra da Gramma, on clay soil, pendent from a steep bank, alt. 930 m., Apr. 19–25, 1925, *Agnes Chase*, no. 9619 (TYPE, in Gray Herbarium). An unnumbered Riedel specimen in the Gray Herbarium from Brazil without more precise locality seems to be the same, though incorrectly referred by Schultz-Bipontinus to *M. microdonta* DC., which has subsessile heads and a finer reticulation of exserted veinlets on the upper surface of the leaves.

M. (§ THYRSIGERAE) SALICIFOLIA Hassl. in Fedde Rep. Spec. Nov. xii. 367 (1913). Thus far this species seems to have been known only from Paraguay, where it occurs on the upper reaches of the Apa River. However, in the herbarium of Mr. Cornelius Osten, of which he has been so kind as to lend the *Eupatoriae* for study at the Gray Herbarium, there is an excellent Argentine specimen of the plant. It was collected by Mr. Rojas, Sept. 13, 1915, in a forest path near the falls of the Yguazú in the Province of Misiones, being no. 7842 in herb. Osten. The species may therefore be henceforth included in the flora of the Argentine Republic as well as in that of Paraguay. Mr. Rojas's field notes indicate that the plant is a liana 5–8 m. in length, with greenish flowers.

M. (§ **Corymbosae**) **stenomeres**, spec. nov., herbacea volubilis;

caule tereti anguste fistuloso dense purpureo-puberulo; internodiis 1.5–1.8 dm. longis; foliis oppositis graciliter petiolatis subhastato-ovatis caudato-acuminatis crenato-dentatis (dentibus minute apiculatis) basi cordatis utrinque puberulis post exsiccationem subolivaceis subtus paullo pallidioribus a basi plerumque 5(3–7)-nervatis 6–7.5 cm. longis 4–5.5 cm. latis membranaceis; petiolo 3–4 cm. longo; corymbis modice convexis ramos laterales 1.2–1.4 dm. longos terminantibus 4–7 cm. diametro; bracteolis ovatis acutis incurvo-puberulis 6–7 mm. longis 4 mm. latis; pedicellis 2–8 mm. longis; capitulis 10–11 mm. longis; involucri squamis oblongo-linearibus subacutis 6–7 mm. longis 1.6 mm. latis praecipue ad apicem versus adpresse puberulis; corollis albis; tubo proprio gracili 3.5 mm. longo minute hispidulo; faucibus vix ullis; lobis limbi sublinearibus acutis ca. 2.5 mm. longis 0.7–0.9 mm. latis glabris; achaeniis 4 mm. longis glabris; pappi setis ca. 60 vix scabratis corollas subaequantibus.—BRAZIL: State of Rio de Janeiro: Serra Itatiaya, small herbaceous twiner in woods, alt. 2100 m., May 17, 1922, *E. W. D. and M. M. Holway*, no. 1856 (TYPE, herb. Univ. Minn., phot. and small fragm. Gr.).

This species in habit somewhat approaches *M. Glaziovii* Bak., which, however, is glabrous, has leaves less deeply cordate and more sharply toothed, much smaller bractlets and quite a different corolla-limb.

Unfortunately two plants, both of which seem to be novelties, were collected together and associated under no. 1856 of the Holway series. While similar in habit and leaf-contour the two may be readily distinguished, the present species by its corymbose inflorescence, relatively large bractlets, linear phyllaries, and particularly by its almost throatless corollas with long narrow almost linear lobes. This material may continue to bear the number 1856. On the other hand the plant distributed with it which has a paniculate inflorescence, much less conspicuous bractlets, oblanceolate-oblong phyllaries, and a campanulate corolla-throat equalling or exceeding the lobes, may be renumbered as 1856a, and becomes the type of *M. additicia*, described above.

M. (§ **Thyrsigerae**) **stereolepis**, spec. nov., scandens thyrsis crispe sordideque puberulis exceptis subglabra; caule subtereti post exsiccationem multicostulato fistuloso; internodiis 1 dm. vel ultra longitudine; foliis oppositis petiolatis oblongis caudato-acuminatis serrato-dentatis basi acutis supra basin pinnatim 5–7-nervatis pallide viridibus subconcoloribus chartaceo-subcoriaceis supra in nervis obscure puberulis subtus subglabris prominulenter reticulatis ca. 12 cm. longis et 4.5 cm. latis; dentibus plerisque ca. 0.5 mm. altis et 3–6 mm. inter se distantibus; petiolis gracilibus ca. 2 cm. longis; paniculis lateralibus et terminalibus pedunculatis pyramidatis op-

positirameis; capitulis ca. 7 mm. altis sessilibus ad apices ramulorum breviter spicatis; bracteolis lanceolatis ca. 2 mm. longis; involucri squamis oblongis apice rotundatis pallidis subglabris textura firmis; corollis albis; tubo proprio 1 mm. longo puberulo; faucibus subcylindratis ca. 2.5 mm. longis; dentibus limbi deltoideis 1 mm. longis; achaeniis (immaturis) subglabris vel ad apicem versus paullo hispidulis ca. 1.8 mm. longis; pappi setis 25–30 flavescenti-albis sublaevibus corollas aequantibus.—ECUADOR: Loja: Chuquiribamba, Nov. 17, series of *Edward François André*, no. 4466 (TYPE, in herb. Royal Gardens, Kew, phot. and small fragm. Gr.).

This puzzling plant is perhaps most closely related on the one hand to *M. pulverulenta* Sodiro and on the other to *M. lancolata* Hieron. From both of these it differs in having dentate leaves, longer, more slender petioles and practically glabrous phyllaries of firmish texture. From Dr. L. B. Smith, who has devoted some care to the working out of the route followed by André, it is learned that this plant from the date on the label was probably not collected by André himself, but by one of his assistants presumably by Poortman.

M. THAPSOIDES DC. Prod. v. 189 (1836). To this species, there should apparently be reduced *M. lagoensis* Bak. in Mart. Fl. Bras. vi. pt. 2, 220 (1876). This decision has been reached only after personal examination of the types and study of the seemingly conspecific material of subsequent date thus far available in the larger herbaria.

Baker keys these species apart on the grounds that the leaves are smaller and petiolate in *M. lagoensis* but larger and sessile in *M. thapsoides*. As to size, intermediates now available show that Baker's measurements have no delimiting value. In regard to the petiole, it may be explained that in both species the upper leaves are sessile, while the main portion of the blade in the middle and lower leaves is more or less conspicuously elevated on a cuneately winged petioliform base. Thus neither of Baker's key distinctions has any real significance.

It is true the original material of *M. lagoensis* has some peculiarities, which might at first sight suggest specific difference. The inflorescence is stunted and the heads somewhat smaller than those found in normally developed *M. thapsoides*, yet the form and dense puberulence as well as the color and texture of the phyllaries are precisely the same. The pedicels and mode of branching are identical. The pappus-bristles are of the same shade and abundance. In fact, one searches in vain for any morphological difference that has significance and will hold.

There would appear to be some slight uncertainty about the habit

of *M. lagoensis*. Tweedie, according to Hooker and Arnott, Comp. Bot. Mag. i. 242 (1836), stated this to be a climbing plant, but Baker describes it as erect and places it in his Series *Corymbosae Erectae*. In the Tweedie specimen, it is true, the stem is slightly flexuous; but in its thickish, softly herbaceous, multicostulate and puberulent character, it agrees closely with the stem of *M. thapsoides*.

Baker is in error in describing the leaves as glabrous above and subentire. They are puberulent on the upper surface and are more or less coarsely crenate at least at the sides, though the latter feature is obscured in the Tweedie specimen since its leaf-margins are curiously erose in such manner as to suggest insect damage occurring during the life of the plant and partially healed by new corky margins of irregular contour.

Altogether, with its dwarfed stature, lack of base, stunted inflorescence and insect-damaged leaves, Tweedie's specimen was a most unfortunate one on which to found a new species; and when Baker added some mistakes of description, it is by no means surprising that *M. lagoensis* has lain long unrecognized. Certainly until far more convincing distinctions can be found than any as yet stated, *M. lagoensis* may find appropriate disposition in the synonymy of the earlier *M. thapsoides* DC.

M. (§ **Corymbosae**) **trachypleura**, spec. nov., volubilis gracilis vel suffruticosa dense breviterque pubescens habitu *M. scandenti* accedens; caule teretiusculo subtomentello; internodiis plerisque 5–9 cm. longis; foliis oppositis graciliter petiolatis ovatis acuminatis grosse undulato-dentatis et saepius hastato-angulatis basi sinu rotundato cordatis 5–6 cm. longis 3–4 cm. latis; corymbis modice rotundatis vel planiusculis; capitulis ca. 6.5 mm. longis terminali sessile vel breviter pedicellato lateralibus graciliter 2–7 mm. longe pedicellatis; pedicellis hirtellis; bracteolis capitula arcte suffulcientibus lanceolatis herbaceis hirtellis plerisque 2–3 mm. longis; involucri squamis anguste lanceolato-oblongis tenuibus acutis vel acuminato-attenuatis ca. 5.5 mm. longis substramineis, exterioribus dorso hirtellis; corollis albis glabris; tubo proprio gracili 1.7 mm. longo; faucibus campanulatis 1.2 mm. altis; dentibus limbi deltoideis acutis ca. 0.7 mm. longis; achaeniis 1.5–1.8 mm. longis in faciebus parce glanduliferis in costis serrulatis vel brevissime ciliolatis; pappi setis ca. 40 pallide carneis.—PARAGUAY: in region of Lake Ypacaray, April-May, 1913, *Hassler*, nos. 12,176 (Gr.) and 12,600 (TYPE, in Gray Herb.); San Bernardino at Atirá in "campos, orillas-estéros," April 1915, *Rojas*, no. 130 (said to = *Hassler*, no. 2500 and being no. 7347 in herb. of Mr. Cornelius Osten); open slopes of hills at Carapeguá, March

1919, *Rojas*, no. 3345 (hb. Osten). BRAZIL: Minas Geraes: at Lagoa Santa, *Warming* (K., phot. Gr.); São Paulo: at Ypiranga, *Luederwaldt*, no. 217 (Gr.) and at Butantan, *Hoehne*, no. 52 (Gr.). ARGENTINA: Colonia Benitez, Chaco, *Schulz*, no. 205 (Gr.); Prov. Corrientes, *Lossen*, no. 595 (Gr.).

This puzzling plant has been found in different herbaria referred to *M. scandens* (L.) Willd., *M. scandens* var. *cynanchifolia* Bak., *M. cordifolia* (L. f.) Willd., *M. cordifolia* var. *tomentosa* Hieron. and to *M. scandens* * *periplocifolia* var. *intermedia* Malme. After prolonged study, it cannot be satisfactorily placed in any of these, since all of them have decidedly more abruptly pointed phyllaries and possess achenes which are nearly or quite smooth on the ribs. Indeed the fine serrulation or even very short ciliolation of the ribs of the achenes in *M. trachypleura*, though a microscopic feature seems an excellent diagnostic character not found elsewhere in the *scandens* group.

M. WARMINGII Sch.-Bip. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 242 (1876). Quite unable to find among the available Brazilian Mikanias anything that could represent this species (described by Baker as a twiner with obovate leaves), the writer requested a loan of the authentic material at Kew. This was kindly and very promptly sent and consisted of a single curved-ascending virgate leafy shoot of material collected by Warming at Lagoa Santa but unaccompanied by number, date, or habital notes.

The stem is neither flexuous nor twisted. The short petioles are quite straight. In fact there is absolutely nothing to show why Baker regarded this plant as a twiner and referred it to his Series *Corymbosae Volubiles*. It appears to be an erect or suberect undershrub presumably related to *M. glauca* Mart., *M. oblongifolia* DC., and *M. subverticillata* Sch.-Bip. among Baker's Series *Corymbosae Erectae*. Furthermore, the leaves are elliptic-oblong and not (as described by Baker) obovate. The plant proves, in fact, to be identical with what the writer not long ago unconsciously redescribed as *M. neglecta* Robinson, Candollea, v. 173 (1934), not dreaming at the time that it could have anything to do with a species characterized as a twiner with obovate leaves. *M. neglecta* is therefore to be referred to the synonymy of *M. Warmingii*.

M. (§ **Corymbosae**) **Werdermannii,** spec. nov., primo aspectu glaberrima sed sub nodis et in inflorescentia minute inconspicueque hirtella verisimiliter scandens; caule hexagono gracili brunnescenti albo-medulloso; internodiis (superioribus solis visis) 4–9 cm. longis; foliis oppositis graciliter petiolatis ovatis acutis margine subundulatis et lateraliter plus minusve hastato-dentatis basi rotundatis vel sub-

truncatis 3–5 cm. longis 2–3.5 cm. latis utrinque viridibus supra obsolete minuteque hirtellis subtus paullo pallidioribus microscopice albido-puncticulatis; petiolo 1.5–2 cm. longo ad laminam versus anguste alato; corymbis in ramo et lateralibus et terminali densiusculis modice convexis; bracteis sessilibus ovalibus acutis integris 5–10 mm. longis 3.5–7 mm. latis; bracteolis ovatis vel obovatis breviter acuminatis basi angustatis 3–4.5 mm. longis ca. 2 mm. latis; involucri squamis lineari-oblongis acutis albido-substramineis leviter striatis glabris ca. 6.5 mm. longis; corollis albis glabris gracilibus; tubo proprio gracili 1.7 mm. longo; faucibus turbinato-subcampanulatis ca. 1.2 mm. altis; dentibus limbi lanceolato-deltoideis ca. 1 mm. longis; achaeniis gracilibus glabris 2.7 mm. longis; pappi setis ca. 36 albis.—BOLIVIA: Dept. El Beni: Rio Chaparé-Marmoré, alt. ca. 250 m., Aug. 1926, *Dr. E. Werdermann*, no. 2235 (TYPE, in Mus. Bot. Stockholm, phot. and small fragm. Gr.).

In many respects similar to *M. cordifolia* (L. f.) Willd. of which it may possibly prove only an aberrant form, yet in general appearance and in minor characters, such as its exceptional smoothness, subhastate leaves, conspicuous oval bracts and bractlets, etc., too unlike to be referred satisfactorily to that common and wide-ranging species.

In its scarcely hirtellous six-angled stem and in its rather broad bracts and bractlets *M. Werdermannii* also recalls the Mexican and Colombian *M. Gonzalezii* Robinson & Greenman, but that has somewhat longer heads, more herbaceous phyllaries, and much larger decidedly cordate leaves, which are perceptibly glandular-punctate and are free from any suggestion of hastate toothing toward the base.

M. yapasensis, spec. nov., lignosa scandens tenuiter griseo-pubescens; caule hexagono albo-medulloso incurvo-puberulo; foliis oppositis graciliter petiolatis ovatis acuminatis brevissime remoteque cuspidato-denticulatis patenter cordatis subconcoloribus utrinque pallide viridibus incurvo-puberulis a basi 5(3–7)-nervatis ca. 6 cm. longis 3.5–4.5 cm. latis membranaceis vel fortasse paullo carnosis; panicula ca. 5 dm. longa et 2 dm. diametro oppositiramea; capitulis ca. 1 cm. longis sessilibus vel breviter pedicellatis in corymbos subhemisphaericos dispositis; bracteolis lanceolatis acutis herbaceis 2.5–3.5 mm. longis; involucri squamis lineari-oblongis vel paullo oblanceolatis obtusis vel acutis flavescente brunneis striatulis subglabris ca. 7 mm. longis; corollis glabris; tubo proprio gracili 2–2.5 mm. longo; faucibus ca. 1 mm. longis; dentibus limbi lanceolato-oblongis ca. 1 mm. longis; achaeniis gracilibus nigrescentibus 3.6 mm. longis parce granulatis, costis pallidis; pappi setis ca. 65 subsalmoneis 4.5 mm. longis.—PERU: Dept. Junín: Pichis Trail, Yapas, alt. 1350–1600 m., June 28–29, 1929, *Killip & Smith*, no. 25,493 (TYPE, in Gray Herb.).

This species is somewhat intermediate between § *Thyrsigerae* and § *Corymbosae*. It slightly recalls *M. carnosa* Muschler, but that has smaller at their maturity much smoother leaves, which are cuneate at base and borne on much shorter petioles, narrower and more acute phyllaries, and yellowish-white not salmon-colored pappus.

Trilisa carnosa (Small), comb. nov. *Litrisa carnosa* Small, Bull. Torr. Bot. Club, li. 392 (1924). Though originally described as "most closely related on the one hand to *Trilisa*, by its involucre, and on the other, to *Carphephorus*, by its chaffy receptacle" its author (Man. Southeastern Flora 1304–5) later quite astonishingly keys this plant from *Trilisa* by "well imbricate" involucre and from *Carphephorus* on the ground that it has the "receptacle naked"!

The writer has been most kindly permitted to borrow the now fairly copious material of this interesting plant from the herbarium of the New York Botanical Garden. This he has carefully studied in connection with identical specimens that have accumulated at the Gray Herbarium. Thus far he can detect no character of generic significance to separate *Litrisa* from the earlier *Trilisa*, to which *L. carnosa* is accordingly here referred. The alleged involucral difference appears in fact a rather vague one of degree only, as may be surmised from a close comparison of the figures on pages 1330 and 1336 of Dr. Small's recently issued and very welcome Manual.

Liatris Ohlingerae (Blake), comb. nov. *Lacinaria Ohlingerae* Blake, Bull. Torr. Bot. Club, l. 203, t. 9 (1923). *Ammopursus Ohlingerae* Small, Bull. Torr. Bot. Club, li. 393 (1924). The writer fully agrees with Dr. Blake that this plant, though adequately marked as a specific entity, falls naturally into the large genus which embraces the Blazing-stars. As to its proper nomenclatural status, however, the above new combination seems needful to bring it under the now very generally accepted International Rules.

II. THE VARIABILITY OF TWO WIDE-RANGING SPECIES OF MIKANIA.

By B. L. Robinson.

Monographic study of any large group of plants is apt to show that it is composed in part of rather constant, pretty readily keyed species of restricted range, uniform habitat and conservative tendencies. On the other hand, there are in considerably smaller number far more variable, wide-ranging and aggressive plant-entities. The latter have invaded or more probably have persisted in habitats of

diverse nature and have assumed in response to local conditions highly perplexing phases.

It is in the rating of these variants of wide-ranging species that the greatest difficulty of classification is encountered. When such phases of polymorphous species first reach scientific attention they are apt to be known only from limited areas and specialized habitats, often at great geographic distance from each other. Under these circumstances, the material available not only shows such phases strikingly unlike as to stature, habit, leaf-form, pubescence, etc., but separated by characters which cannot at the time be shown to break down through intergradation. Under these circumstances, they are apt to seem worthy of specific rank. In fact they are generally and very properly so treated until intermediate material becomes available. Each decade brings to attention transitional material of the sort, and in order to give species formerly regarded as distinct the new varietal or formal rating appropriate to their newly demonstrated intergrading nature it must often become necessary to abandon well known binomials and replace them by far less convenient trinomials or even polynomials.

However, polymorphous species certainly do occur in nature and as their different phases are found to show conclusive evidence of intergradation, the needful reductions and nomenclatural changes should be made with promptness to keep taxonomy in accord with existing knowledge.

A somewhat complicated case of this nature was recently treated in the commemorative volume Ostenia, where on pages 349–355 the writer assembled under the earliest available specific name, *Eupatorium lanigerum* Hook. & Arn., a considerable number of varieties and forms hitherto treated either as distinct species or merged under the later and now unavailable name *E. alternifolium* Sch.-Bip. The present paper attempts similar discussion of two other variable species of wide range.

Mikania Hookeriana DC.

When treating *Mikania Hookeriana* DC. in the Flora Brasiliensis, Baker reduced to it without apparent hesitation the far more robust and much broader-leaved *M. platyphylla* DC. of Peru. The unlikeness of these plants when examined in their extremes is certainly striking, yet when treating the Mikanias of Bolivia some twelve years ago, the writer was forced to the conclusion that the two were "very closely related if not actually identical." Much subsequently accumulated material now available makes the union of these species unavoidable.

Furthermore, it has become clear that to the aggregate there must be added *M. Badieri* DC. and *M. Imrayana* Griseb. of the Lesser Antilles, *M. gracilis* Sch.-Bip. of Surinam, and *M. vitrea* Robinson of Venezuela and Trinidad.

In all these plants the heads are closely sessile. They are sometimes glomerate at or very close to the tips of the panicle-branchlets, as in the type-specimen of *M. Badieri*, but usually they are crowded along the distal portion of these branchlets, thus being disposed in short dense spikes.

Repeated attempts have been made to find any involucral, floral, or achenial differences which would separate these species. Many promising characters were readily seen, but all broke quite hopelessly when studied in specimens of different stages of development and from diverse habitats.

Thus, in the absence of anything which can be construed as a specific distinction, it becomes necessary to select the name under which the combined species should pass. Of the names available in the group, the three oldest were published simultaneously by DeCandolle in the fifth volume of the Prodromus, namely *M. Badieri* on page 194 and *M. platyphylla* and *M. Hookeriana* on the following page.

In choosing between names of like date and applicable to the same group, page-priority has ceased to have any compelling significance, and from Art. B. 46 of the International Rules, the author first uniting such groups may select whichever of the names may seem best, and his choice must thereafter be followed. In this case, the first attempt to unite any of the species concerned seems to have been Baker's mention of *M. platyphylla* in the synonymy of *M. Hookeriana* and it is therefore in accord with the spirit of the International Rules of Botanical Nomenclature that the latter name be accepted as the one to be applied to the polymorphous species under consideration. This is rather fortunate, for the original material of *M. Hookeriana* is better than that of *M. platyphylla*. Furthermore, *M. Hookeriana* represents one of the continental phases of the aggregate, while *M. Badieri*, though possessing a trifling page-priority—a matter now of no compelling significance—would be decidedly less desirable as the type of a multiform species, since it represents a phase peculiar to a small island and shows a slight difference in inflorescence, a character that may be strengthened by the possible discovery of other traits as the plant of Guadeloupe becomes better known.

The chief phases of the united species may be presented thus.

M. HOOKERIANA var. **typica**. Caulis modice gracilis glaber vel subglaber albo-medullosus laxe scandens. Folia graciliter petiolata

ovato-oblonga vel elliptica acuminata vel acuta vel rariter obtusa integerrima pleraque 2–5 cm. lata membranacea vel plus minusve carnosa. Capitula secundum ramos paniculae sessilia congestim spicata.—*M. Hookeriana* DC. Prod. v. 195 (1836). *M. gracilis* Sch.-Bip. ex Miq. Stirp. Surinam. Sel. 187 (1850). *M. Imrayana* Griseb. Fl. Brit. W. Ind. 363 (1861). *Willoughbya Imrayana* Ktze. Rev. Gen. i. 372 (1891).—This typical variety, based on material from British Guiana, is also present in Dutch Guiana, on Dominica and probably several of the other Lesser Antilles. Baker (Fl. Bras. vi. pt. 2, 242) records the species (with which he was uniting the broad-leaved *M. platyphylla*) in "Nicaragua: Ralph Tate n. 132." The writer has had no opportunity to verify this Central American record, but has seen undoubted material of var. *typica* from Tehuantepec in southernmost Mexico, *Orcutt* no. 3434 (Mo.). Though Baker (l. c.) cites *M. Hookeriana* from several points in Brazil, the writer has thus far seen no Brazilian material that could be referred to var. *typica*. A form scarcely distinguishable from var. *typica*, though tending to intergrade with var. *platyphylla*, occurs in the Mapiri region of Bolivia.

Var. **Badieri** (DC.), stat. nov. Caulis modice gracilis glaber vel subglaber. Folia ovalia vel elliptico-oblonga saepius breviter et obtuse cuspidato-acuminata integerrima subcoriacea. Capitula ad apices ramorum paniculae glomerulata vix vel nullo modo spicata.—*M. Badieri* DC. Prod. v. 194 (1836).—This particular expression of the *M. Hookeriana* group, though known as yet only from the island of Guadeloupe in the Lesser Antilles, is pretty certainly conspecific with the continental forms found in British Guiana, Surinam, etc.

Var. **Kittsiana** (Urb.), stat. nov. Caulis modice gracilis et glaber verisimiliter laxe scandens. Folia late ovata cuspidato-acuminata grosse undulato-dentata. Capitula secundum paniculae ramos ad apices versus dense spicata.—*M. Badieri* var. *Kittsiana* Urb. Symb. Ant. v. 220 (1907).—St. Kitt's, *Britton & Caldwell*, no. 385 (U. S., phot. Gr.).

Var. **platyphylla** (DC.), stat. nov. Planta multo robustior distincte lignescens valde volubilis. Caulis (5 mm. vel ultra diametro) fistulosus aut glaber aut praesertim in parte superiore setuloso-puberulus. Folia late ovata plerumque cuspidato-acuminata basi obtusa vel subtruncata integra crassa textura subcarnosa et fragilia pleraque 6–13 cm. lata. Capitula ad apices versus paniculae ramorum dense spicata.—*M. platyphylla* DC. Prod. v. 195 (1836). *M. vitrea* Robinson, Contrib. Gray Herb. lxi. 22 (1920). *Willoughbya platyphylla* Ktze. Rev. Gen. i. 372 (1891).—From the Amazonian drainage

of Bolivia and Peru to Venezuela and Trinidad. Also recently collected in Colombia: Dept. Boyacá, *Lawrance*, no. 447 (Field Mus.).

Var. **cardiophylla**, var. nov., varietati praecedenti similis differt caule minus lignescenti et foliis (saltim caulinis) ut videtur tenuioribus basi distincte cordatis.—St. Vincents, Lesser Antilles, *H. H. & G. W. Smith*, no. 1890 (TYPE, in Gray Herb.).

MIKANIA VITIFOLIA DC.

The little known Brazilian species *Mikania vitifolia* was founded upon a specimen from São Paulo. The type is no. 426 of the collection given to Gaudichaud for his services to the Brazilian government and in 1833 presented by him to the Museum of Natural History in Paris.

This specimen shows but a single leaf, though it bears some much reduced foliar bracts in the inflorescence. The leaf is large, long-petioled, and has a suborbicular and sharply 7-angled blade. The five angles on the main part of the blade are developed as deltoid lobes, each with an acuminate tip. The lowest angles, however, are mere teeth on the rounded lobes near the deeply cordate base. This striking specimen from southern Brazil has never been precisely matched so far as the writer knows. However, Baker in the Flora Brasiliensis associated with the species specimens collected in São Paulo by Sello and by Riedel, but described the leaves as 5-lobed.

The first very close relative of this species subsequently published was *M. punctata* Klatt, Bull. Soc. Bot. Belg. xxxi. 195 (1893). This was based on Costarican material collected by Pittier (nos. 3434 and 4934). It was incorrectly described as having 7-flowered heads, though these were really 4-flowered even in the type-material. Klatt failed to indicate the general leaf-form of his *M. punctata*, but in the specimens which he studied it varied in the main stem-leaves from deltoid-ovate with but one angle on each side to somewhat pentagonal-ovate, a form in which below the spreading lateral lobes there occurs on each side an obtuse angle or abrupt bend in the leaf-contour. On the other hand, the smaller upper leaves are broadly ovate and scarcely or not at all angled laterally.

Hieronymus in Engl. Bot. Jahrb. xix. 46 (1894), studying Colombian material collected by Lehmann and in essentials identical with the Costarican plant which had formed the basis of *M. punctata* Klatt, referred it without any qualification to *M. vitifolia* DC.

The next complication arose from the description of *M. boliviensis* Lingelsheim in Fedde Rep. vii. 251 (1909), a plant collected by Buchtien at San Carlos near Mapiri in Bolivia. In all its more im-

portant characters, as well as in its 3–5-angled leaves, this agreed closely with *M. punctata* Klatt. As already pointed out, Contrib. Gray Herb. c. 18 (1932), Klatt's *M. punctata* is a homonym of the much earlier *M. punctata* Gardn. Therefore, even if Klatt's *M. punctata* should prove specifically distinct from *M. vitifolia* DC., it would have to bear the later name *M. boliviensis* Lingelsh.

In 1924 the writer ventured to found a species of this general affinity on a Peruvian specimen, *Macbride* no. 4683, which had ovate but quite unlobed and unangled, though obscurely cuspidate-denticulate, leaves. Close approaches to this Peruvian plant, called *M. cryptodonta*, have subsequently been found in the Amazonian drainage of Brazil, on the delta of the Orinoco in Venezuela, and on the island of Trinidad.

The conspicuous differences in the leaf-form at first seemed fully adequate in the specific separation of these three plants, *M. vitifolia*, *M. boliviensis* (*M. punctata* Klatt not Gardn.) and *M. cryptodonta*, particularly as they had been characterized from widely separated regions. However, the geographic gaps and the striking differences have now been in large measure bridged by intermediates. As this tendency became evident, the writer has made repeated efforts to discover other and more fundamental differences, but quite without success. The three plants are found to be in close agreement in all essentials of inflorescence, floral form, achenes, etc., as well in such minor traits as pubescence, punctation of leaves, obscure toothing of leaf-margin, and the color, texture and nervation of the leaves.

Indeed, it has become increasingly evident that these plants, though conspicuously different in their extremes, are only formal expressions of a single widespread and polymorphous plant-entity. It is believed, therefore, that the following treatment will provide adequate nomenclatural status for the phases concerned.

M. VITIFOLIA forma **typica**. Folia (caulina matura) suborbicularia acute 7-angulata et obscure denticulata.—*M. vitifolia* DC. Prod. v. 202 (1836).—São Paulo, Brazil.

Forma **boliviensis** (Lingelsh.), stat. nov. Folia subdeltoideo-vel pentagono-ovata 3(–5)-loba et obscure denticulata.—*M. punctata* Klatt, Bull. Soc. Bot. Belg. xxxi. 195 ("1892" [1893]), not Gardn. *M. vitifolia* Hieron. in Engl. Bot. Jahrb. xix. 46 (1894), not precisely DC. *M. boliviensis* Lingelsh. in Fedde Rep. vii. 251 (1909).—Southern Mexico and Central America to Bolivia; also with outlying stations far to the eastward at Faca in the State of São Paulo, Brazil, *Edwall* no. 12 (hb. Inst. Biol. S. Paulo no. 16,432) and in the Federal District of Venezuela near Caracas, *Birschel* (Gr.).

Forma **cryptodonta** (Robinson), stat. nov. Folia (plerumque eis formarum praecedentium paullo minora) ovata obscure cuspidato-denticulata neque lobata neque angulata.—*M. cryptodonta* Robinson, Contrib. Gray Herb. lxxiii. 22 (1924).—PERU: southern Huanaco, *Macbride*, nos. 4552 (Gr.) and 4683 (Gr.); also northern Junín, *Killip & Smith*, nos. 23,835 (Gr.) and 25,313 (Gr.). BRAZIL: Rio Acre Territory, Seringal S. Francisco, *Ule*, no. 9885 (K., phot. Gr.); State of Para, at Belem, *Dahlgren & Sella*, nos. 230 (Gr.) and 287 (Gr.). VENEZUELA: Orinoco Delta, Cano del Guinipa, *Bond, Gillin & Brown*, no. 92 (Gr.). TRINIDAD: *Eggers*, no. 1457 (Copenh.), *Broadway*, nos. 5102 (N. Y.) and 7000 (Gr.).

III. MIKANIA SCANDENS AND ITS NEAR RELATIVES.

BY B. L. ROBINSON.

THE plants referred by such authors as Schultz-Bipontinus, Baker, Klatt, Oliver, Hemsley, Hieronymus and Urban to *Mikania scandens* (L.) Willd. form a loose aggregate of small-headed, slender, cordate-, sagittate-, or hastate-leaved perennial twiners of North American and pan-tropical distribution.

Although long treated as a single polymorphous species, this complex, taken as a whole, does not have an ordinary or, from the phytogeographic point of view, convincing range. On the other hand, if its elements are examined separately they drop into fairly circumscribed natural areas. Indeed, these individual ranges are in several cases mutually exclusive.

When treating the Mikanias of northern and western South America in 1922, the writer (Contrib. Gray Herb. lxiv. 24) indicated a provisional separation of the tropical American *M. micrantha* HBK. from the *M. scandens* aggregate, but through lack of material was obliged to suspend judgment regarding several Brazilian expressions of the group, as well as its still more problematic Old World phases. This need of adequate material is still much felt in the case of the African representatives of the group and about them little can even yet be decided. However, by the aid of the now pretty copious material (running to several hundred specimens) already examined, it seems possible to advance at least a working theory concerning the American, Asiatic and Malaysian segregates of the complex.

Though conclusions on the as yet all too imperfectly understood African members of the group must be deferred, the other elements in the aggregate may be tentatively summarized thus.—

M. SCANDENS (L.) Willd. (sensu strictiori). Heads about 7 mm. long, mostly crowded in round-topped fastigiately branched corymbs; bractlets subfiliform to narrowly lanceolate, usually about two-thirds the length of the involucre; phyllaries lanceolate-linear, attenuate, whitish and often purplish-tinged; corollas pink, pale purplish or rarely white; pappus-bristles 30–35, white or sometimes purple-tinged.—Sp. Pl. iii. 1743 (1804). *Eupatorium scandens* L. Sp. Pl. ii. 836 (1753).—Wet thickets, southern Maine to Florida, chiefly near the coast, and (in more doubtful forms tending to white corollas and greater pubescence) through the Gulf States to Texas; also locally in the interior especially in New York, Southern Michigan, northern Indiana, eastern Missouri and Oklahoma.

This plant is in general nearly but never quite glabrous, but especially to the southward it passes imperceptibly into more hairy phases (*M. pubescens* Muhl., *M. menispermea* DC., *M. scandens* var. *pubescens* Torr. & Gray), which, however, appear to have no more than formal value.

The lilaceous coloration, nearly always perceptible, occurs most often in the corollas, but sometimes becomes evident in the pappus and phyllaries even when the corollas are by exception white.

M. MICRANTHA HBK. Heads at maturity somewhat openly corymbose-paniculate, about 6 mm. long; bractlets narrowly lanceolate to elliptic, about half to two-thirds the length of the involucre; phyllaries linear, acute, greenish-stramineous; corollas white, the teeth small, spreading or recurved at tip, about 0.5 mm. long; pappus-bristles about 33–36, white or (especially in age) somewhat rufescent.—Nov. Gen. et Spec. iv. 134 (1820). *M. orinocensis* HBK. l. c. *M. subcrenata* H. & A. Comp. Bot. Mag. i. 243 (1836). *M. umbellifera* Gardn. in Hook. Lond. Jour. Bot. iv. 119 (1845) and *M. scandens* var. *umbellifera* Bak. in Mart. Fl. Bras. vi. pt. 2, 249 (1876) as well as *M. glechomaefolia* Sch.-Bip. ex Bak. l. c., being the more typical form with oval rather abruptly pointed and mostly crenate-dentate leaves. *M. subcymosa* Gardn. in Hook. Lond. Jour. Bot. vi. 448 (1847) and *M. scandens* var. *subcymosa* Bak. l. c., a seemingly trivial variant with more triangular-ovate, gradually pointed and subentire leaves.—Generally distributed from Mexico and the West Indies to Brazil, Argentina and Bolivia. A few doubtful specimens from tropical Florida may also belong here.

Though not capable of sharp definition on the side of *M. scandens*, this plant is of widely different and far more tropical range. Furthermore, it shows several perceptible distinctions. Thus its heads tend to be smaller. Its inflorescence is habitually looser and more panicu-

late. The phyllaries are acute rather than attenuate as in *M. scandens*. It seems never to show the purplish coloration nearly always present in *M. scandens*. The throat of the corolla is usually more turbinate-campanulate and the teeth tend to be shorter and more disposed to terminate in a spreading or recurved tip. While the leaves vary greatly in contour both in *M. scandens* and in *M. micrantha*, they tend on the whole to be more sharply angled and triangular-sagittate or -hastate in the former and more oval, cordate, and merely crenate in the latter. These foliar distinctions, though not holding good for diagnostic purposes, become evident when the species are compared in extended series.

Of this species, *M.* ? *alata* DC. Prod. v. 197 (1836) is a probable, though by no means certain, synonym. It was hesitatingly based by DeCandolle—apparently from description alone—upon *Kleinia alata* G. F. W. Mey. Prim. Fl. Esseq. 249 (1818). No type or authentic material of Meyer's species is known either at Goettingen, where Meyer worked, or elsewhere so far as ascertained. While most of the characters mentioned in the original description apply to *M. micrantha*, some do not. For instance, the statements that the leaves are very entire, that the bractlets are deciduous, and that the "4–5" phyllaries are equal in length do not satisfactorily correspond. Under these circumstances, the slightly earlier specific epithet *alata*, unsubstantiated by authentic material, should scarcely be taken up to replace, especially in a group of such inherent difficulty, the definitely known *M. micrantha*.

As in *M. scandens*, the pubescence of *M. micrantha* varies much in extent, the more typical forms being smoothish. A hairy phase has been described as:

Forma HIRSUTA (Hieron.) Robinson. Stems, petioles and usually both surfaces of the leaves covered with sordid-white perceptibly jointed hairs.—Contrib. Gray Herb. lxiv. 43 (1922). *M. scandens* var. *hirsuta* Hieron. in Engl. Bot. Jahrb. xix. 47 (1894) and *M. scandens* var. *villosa* Hieron. l. c. xxxvi. 473 (1905).—Colombia to Peru.

M. CONGESTA DC. Heads shortly pedicelled or subsessile in somewhat corymbosely disposed rather dense subglobose glomerules; bractlets narrowly oblong to linear-oblanceolate, herbaceous, spreading-puberulent, equalling or somewhat exceeding the involucre; phyllaries oval to oblong, abruptly but sharply mucronate, greenish-white to yellowish-green, dorsally puberulent, about 4.5 mm. long; corollas white, the proper tube about 1.6 mm. long; pappus-bristles 33–37, white. Leaves deltoid-ovate to ovate-oblong, cordate, acumi-

nate, varying from coarsely and somewhat hastately toothed to crenate, undulate or subentire, mostly 5–9 cm. long.—Prod. v. 197 (1836). *M. Sieberiana* DC. l. c. 196 (1836). *M. Parkeriana* DC. l. c. 199 (1836). *M. variabilis* Gardn. in Hook. Lond. Jour. Bot. v. 486 (1846). *M. atriplicifolia* Sch.-Bip. in Miq. Stirp. Surinam. Sel. 189 (1850). *M. scandens* var. *congesta* Bak. in Mart. Fl. Bras. vi. pt. 2, 249 (1876). *M. scandens* var. *cynanchifolia* as incorrectly applied by Hieron. in Engl. Bot. Jahrb. xix. 46 (1894), though not of Bak. (as to name-bringing synon.). *M. micrantha* forma *congesta* Robinson, Contrib. Gray Herb. lxiv. 43 (1922). *M. micrantha* var. *cynanchifolia* as interpreted by Robinson, l. c. 67 (1922), but not of Bak. (as to name-bringing synon.).—In the lowlands of southeastern Mexico (Tuxpeña, Campeche, *Lundell*, no. 1364), Porto Rico, Santa Domingo, the Lesser Antilles, Trinidad, the Guianas and Brazil; also in the cordilleran countries of South America from Colombia to Peru and Bolivia.

To the southward, as for instance in southern Brazil, Paraguay, Uruguay and the Argentine Republic, this species, at least in its more typical and smoothish form, is scarcely found, though in habit sometimes rather puzzlingly simulated by the smaller-headed *M. periplocifolia.*

M. PERIPLOCIFOLIA Hook. & Arn. Heads smaller than in any of the foregoing, about 5–5.5 mm. high, in somewhat corymbously disposed and usually crowded subspherical glomerules; bractlets subfiliform to narrowly lanceolate or more rarely rhombic- or spatulate-obovate, herbaceous, puberulent; phyllaries narrowly oblong to oval-elliptic, abruptly pointed or often rounded at the slightly erose summit, 2.2–2.5 mm. long; corollas white, slightly smaller than in *M. micrantha* and *M. congesta;* pappus-bristles 35–40, white or at length carneous; leaves prevailingly deltoid-ovate and tending to be saliently and hastately toothed, averaging smaller than in the preceding species.—Comp. Bot. Mag. i. 243 (1836). *M. scandens* var. *periplocifolia* Bak. in Mart. Fl. Bras. vi. pt. 1, 249 (1876), only as to the typical Argentine material. Here also may be provisionally placed the Chilean *M. araucana* Phil. Anal. Univ. Chil. lxxxvii. 330 (1894) and *M. humilis* Kunze ex Hieron. in Engl. Bot. Jahrb. xxii. 792 (1897), plants in nearly every respect closely similar, but having the phyllaries abruptly short-pointed instead of rounded at the summit as is more usual in the species. In similar manner, the Paraguayan *M. scandens* var. *sagittifolia* Hassl. in Fedde Rep. Spec. Nov. xii. 368 (1913) appears to be merely a smoothish and narrow-leaved form of *M. periplocifolia.*—Southern Brazil, Paraguay, Uruguay, central and northern Argentina and northern Chile.

This species can almost always be distinguished from any of the foregoing by its very small heads and mostly oval-elliptic and very blunt phyllaries. The leaves, however, are so variable as to be at times very misleading. Though in its more typical forms they seem pretty characteristic in their prominent and hastate toothing, they sometimes (especially in mesophytic habitats) rather closely simulate those common in the more northern species.

As to indument, it may be said that the typical form of *M. periplocifolia* is finely pubescent. It passes on the one hand to a nearly glabrous form and on the other to a form with slightly more copious soft and grayish puberulence, the latter having been described first as *M. scandens* * *paraguayensis* Malme, Kgl. Sv. Vet. Akad. Handl. xxxii. no. 5, p. 36, t. 4, f. 10 (1899) and later as *M. scandens* var. *periplocifolia* subvar. *mollis* Chod. Bull. Herb. Boiss. ser. 2, iii. 712 (1903).

To the synonymy of *M. periplocifolia* there must be provisionally added also *M. Niederleinii* Hieron. in Engl. Bot. Jahrb. xxii. 792 (1897) from Santa Ana in the Argentine Misiones. This is a plant known to the writer merely from its type-specimen at the Botanical Museum in Berlin, and even there the material is scanty, showing but a single leafy stem, terminated by a small rather dense and glomerate inflorescence. In all technical characters of bractlet, phyllaries, corollas, achenes, etc., the plant corresponds closely with *M. periplocifolia*. It is true the leaves seem a little thicker, harsher in texture and on the lower surface more prominently netted-veined than is usual in *M. periplocifolia*, but these are matters quite likely to result from differing edaphic factors.

M. MENDOCINA Phil. This species is known solely from the type-material. It is certainly very nearly related to but is not to be satisfactorily merged with *M. periplocifolia* for it is an essentially glabrous plant with even smaller heads, scarcely 5 mm. in length. The ultimate bractlets, which as in *M. periplocifolia* closely subtend the heads, are not merely smaller, being for the most part shorter than the involucres, but are neither herbaceous in texture nor puberulent as in *M. periplocifolia*. Furthermore, the phyllaries instead of being obtuse or rounded at the summit and puberulent on the dorsal surface are acuminate, essentially glabrous and conspicuously dotted (as are also the upper parts of the corollas) with brownish-orange globular glands. —Sert. Mendoc. Alt. 20, Anal. Univ. Chile, xxxvi. 178 (1870).— Marshes near Mendoza, Argentina. It is probable that this little plant will prove a distinct species, as believed by Philippi, but it will have to be studied from far more copious material before there can be any assurance regarding its proper status.

M. minima (Bak.), stat. nov. Heads even smaller than in two preceding species, 3–3.6 mm. long, pedicellate and often tending to be racemose; bractlets subfiliform, about 2 mm. long, borne near the middle or even at the very base of the pedicel; phyllaries elliptic-oblong, abruptly short-pointed, about 2.3 mm. long, dorsally puberulent especially toward the apex; corollas white, glandular-atomiferous; proper tube slender; throat turbinate-campanulate; teeth very short (0.2–0.3 mm. long), pointed, usually recurved; mature achenes 1–1.2 mm. long; pappus-bristles about 25, whitish. Branches and branchlets 6-angled, finely incurved- or crisped-puberulent; leaves deltoid-ovate, entire, acute to often rounded at apex, openly cordate to subtruncate at base, mostly 2.5–3.5 cm. long.—*M. scandens* var. *minima* Bak. in Mart. Fl. Bras. vi. pt. 2, 250 (1876).—Argentina: Province of Tucumán, *Tweedie*, no. 1188 (TYPE, in hb. Royal Bot. Gard. Kew, phot. Gr.); Dept. Trancas on Rio Tipamaya, alt. 1400 m., Apr. 1926, *Venturi*, no. 4178 (Arn. Arb., phot. Gr.).

This small-headed plant, known only from the Province of Tucumán in northern Argentina, seems to be one of the best marked species in the perplexing *M. scandens* group. Its branches are as definitely hexagonal as in the well known *M. cordifolia*. Its heads are the smallest in the group. They also tend perceptibly to be racemose toward the tips of the panicle-branchlets. It is noteworthy also that the bractlet, instead of being at the summit of the pedicel and appearing like a fifth phyllary as it does in the other members of the group, is in *M. minima* borne near the middle or even at the very base of the pedicel.

M. TRACHYPLEURA Robinson (See p. 46). Heads (when fully mature) 6–7 mm. long, pedicellate in round-topped rather dense corymbs; bractlet closely subtending the involucre, lanceolate, attenuate, subherbaceous, grayish-pilose, about half the length of the involucre; phyllaries linear to narrowly lanceolate, mostly attenuate, 4–5 mm. long, at least the outer ones loosely villulose; corollas white, the slender tube 1.7 mm. long, the narrowly campanulate throat about 1.2 mm. high, the teeth deltoid, acute, 0.7 mm. long; achenes 1.5 mm. long, upwardly scabrid-ciliolate or serrulate on the angles as well as sparingly glandular-atomiferous on the faces; pappus-bristles about 40, white or slightly carneous.—*M. scandens* var. *cynanchifolia* Bak. in Mart. Fl. Bras. vi. pt. 2, 249 (1876), in small part but not as to name-bringing synonym *M. cynanchifolia* Hook. & Arn.—A vigorous softly pilose nearly or quite herbaceous twiner of central and southern Brazil, northern and central Paraguay and adjacent part of the Argentine Government of Chaco.

In connection with *M. trachypleura* it is needful to examine the nomenclatural claims of the name *cynanchifolia*, which has been vaguely employed for several plants of this affinity. *M. cynanchifolia* Hook. & Arn. was first published in synonymy by Baker, who in the Flora Brasiliensis, vi. pt. 2, 249 (1876), made it the nomenclatural basis of his *M. scandens* var. *cynanchifolia*. Unfortunately Baker's diagnosis was brief, comparative and not very illuminating. He was not even comparing his variety with the nearly related tropical American relatives, but was merely putting forward, as an exceptionally pubescent variety of the North American *M. scandens*, some four specimens of central and southern Brazil, together with a Tweedie specimen from Tucumán in Argentina.

The writer, desiring more precise information regarding the identity of the unpublished *M. cynanchifolia* Hook. & Arn., commissioned Dr. I. M. Johnston during a recent visit to the Royal Botanic Gardens at Kew to look the matter up. Finding difficulty in interpreting the material there at hand, Dr. Johnston kindly arranged that three sheets illustrating Baker's *M. scandens* var. *cynanchifolia* should be lent to the writer for study. These were as follows:

1) Burchell's no. 8922 from Goyaz, a plant with densely glomerulate nearly sessile heads, obtusish to abruptly pointed phyllaries and relatively long bractlets, which exceed the involucres. This element proves to be only a rather pubescent form of *M. congesta* DC.

2) The Warming specimen collected at Lagoa Santa in Minas Geraes, a plant with looser inflorescence, acuminate phyllaries, much shorter bractlets (only half to two-thirds the length of the involucres) and achenes distinctly ciliolate on the angles. This element is conspecific if not precisely identical with the plant, now known from Paraguay and the Argentine Chaco, which has been treated above as *M. trachypleura*.

3) Tweedie's no. 1091, said by the label to be "a firmly rooted climber in all the marshes of the country of Bs. Ays. & R. Grand." that is to say, Buenos Ayres and Rio Grande do Sul. Near the single specimen on this sheet is written in hand of Sir William Hooker the name *M. cyanchifolia* H. & A., the specific epithet being misspelled, doubtless by mere clerical error. The plant, while in most respects closely simulating *M. trachypleura*, has somewhat smaller heads (about 5.5 mm. instead of 6.5 mm. long) and achenes quite destitute of serrulation or ciliolation on the angles.

Sir Arthur Hill informs me that this is the only sheet in the representation of *Mikania cynanchifolia* Hook. & Arn. at Kew which bears the original labelling in hand of Hooker or Arnott, and that no specimen of *Tweedie* no. 1287 has been found there.

Before deciding upon the degree to which the name *cynanchifolia*, first published in varietal rank by Baker in 1876, is available in specific rank, it will be best to trace its subsequent use. In 1894, Hieronymus in Engl. Bot. Jahrb. xix. 46 applied it (as Baker's variety) to a plant of Ecuador, which seems to be only a rather pubescent form of *M. congesta* DC. Next, Malme in Kgl. Sv. Vetensk.-Akad. Handl. xxxii. no. 5, 35 (1899) stated that the plant he was there characterizing as *M. scandens* * *periplocifolia* var. *intermedia* somewhat approached *M. scandens* * *cynanchifolia* (Bak.). Later, Robinson, Contrib. Gray Herb. lxiv. 67 (1922), following Hieronymus, employed the name *cynanchifolia* for a rather pubescent plant of Ecuador with glomerulate heads and long bractlets, but transferred it as a variety from the North American *M. scandens* to the tropical American *M. micrantha* HBK. More recent study leads to the belief that this plant of Ecuador is merely an unusually pubescent and rather small-headed form of *M. congesta* DC. In 1931, Malme, Ark. f. Bot. xxiv. no. 6, 39, employs as his own the binomial *Mikania cynanchifolia* but fails to give the plant further definition. Somewhat later, Malme, l. c. xxiv. no. 8, 33 (1932), realizing that his *intermedia* differed decidedly from the smaller-headed and much blunter-phyllaried *M. periplocifolia*, republished it as *M. cynanchifolia* forma *intermedia*, again making no attempt to give *M. cynanchifolia* correct nomenclatural status by providing it with specific diagnosis, which, as already pointed out, it has never had. Finally in 1933, Malme, Kgl. Sv. Vetensk.-Akad. Handl. ser. 3, xii. no. 2, 58, in determining Dusén's admirable collection of Paraná plants makes use of the name "*M. cynanchifolia* (Hook. & Arn. ms.) Malme."

On what, it may be asked, does *M. cynanchifolia* as a published name really rest? Undefined by its original authors, it appeared first in the synonymy of Baker's *M. scandens* var. *cynanchifolia*, but according to the International Rules of Botanical Nomenclature citation in synonymy does not constitute valid publication.

Of course, Malme has subsequently treated *M. cynanchifolia* as a good species with parenthetic references to Baker and to Hooker & Arnott and may therefore be thought to have validated the binomial in specific rank. However, there remains the question whether it is in fact a described species.

The only attempt ever made to give it diagnosis is Baker's scant three lines of description, drawn up, as we now see, from a confused group of five specimens belonging to three different species. These he was grouping together merely as a very hairy variety of the North American *M. scandens*, with which they clearly have nothing to do.

It would be natural to suppose that the type of *M. cynanchifolia* would automatically be the Tweedie element from Tucumán, this being the only specimen *mentioned* by Baker which had been *studied* by Hooker & Arnott; but unfortunately the only Tweedie sheet now in the Kew Harbarium, labelled by Sir William Hooker as *M. cyanchifolia* and by Baker subsequently as his *M. scandens* var. *cynanchifolia*, is not from Tucumán but from "Buenos Ayres and Rio Grande do Sul." Furthermore, this last specimen does not in all respects agree with Baker's description, for it has leaves equally hairy on both sides, while Baker states that the leaves of his var. *cynanchifolia* were obsoletely puberulent above and densely grayish-puberulent beneath.

When these facts are taken into account, it becomes evident that *M. cynanchifolia* Hook. & Arn. has at no time received intelligible definition. The name, originally misspelled by its senior author and used subsequently by Baker to cover chiefly if not wholly non pertinent material of several kinds, has fallen into a status so vague that it seems best in the interests of sound nomenclature to attach the concept by arbitrary typification to Tweedie's no. 1091. When thus anchored, the species may be defined as follows:

M. cynanchifolia Hook. & Arn. in herb., herbacea gracilis volubilis fere ubique incurvo-puberula; caule 6-costato-angulato flexuoso; foliis oppositis graciliter petiolatis ovatis acuminatis lateraliter paullo undulatis basi sinu profundo sagittatis textura herbaceis subconcoloribus utrinque aequaliter subdense breviterque incurvo-puberulis 2.4–3.3 cm. longis 1.2–1.6 cm. latis; petiolo ca. 1.2 cm. longo; corymbis parvis subglobosis plerisque 2–3 cm. diametro ramos breves adscendentes terminantibus; capitulis breviter pedicellatis ca. 5.5 mm. longis; bracteola capitulum arcte suffulciente lanceolata vel anguste ovata dorso dense griseo-hirsutula 2.5 mm. longa; involucri squamis oblongo-lanceolatis plerisque acutis ca. 4 mm. longis et 1 mm. latis, exterioribus dorso hirsutulis; corollis glabris; tubo proprio gracili 1.6 mm. longo; faucibus campanulatis 1 mm. altis; dentibus limbi deltoideis 0.6 mm. longis; achaeniis 1.5 mm. longis in faciebus glandulis sessilibus adspersis in costis laevibus; pappi setis ca. 33 albis.—The Tweedie label accompanying this material in the herbarium of the Kew Gardens reads as follows: "1091 This a firmly rooted climber in all marshes of the country of Bs. Ays. & R. Grand. –92 & –93 in marshes near Lagoa De Los Pattos." From this it is inferred that the specimen actually with the label is no. 1091 and comes from the region of Buenos Ayres, Argentina, but that Tweedie regarded as identical two specimens which he subsequently added to his series under the numbers 1092 and 1093 and which came from the marshes about Lagoa dos Patos in Rio Grande do Sul, Brazil.

Of course, the species of this technical group are habitally similar and were at the time little understood. Therefore Tweedie's inference that his 1091 from eastern Argentina was precisely identical with material later collected in southernmost Brazil, though by no means improbable, carries little conviction.

Very closely related to *M. cynanchifolia* Hook. & Arn., as thus typified and defined, is the still problematic plant of the Paraguay River drainage called

M. CYNANCHIFOLIA forma INTERMEDIA Malme, Ark. f. Bot. xxiv. no. 8, 33 (1832). This plant, of which Professor Malme has most amiably given to the Gray Herbarium a portion of the type-material, simulates the typical form in pubescence and most of its floral characters. It appears, however, to be a much more luxuriant plant, has much longer internodes and petioles and much larger relatively broader leaves, which are provided at base with spreading and sometimes sharp angles, almost in the manner of *M. periplocifolia*. Its phyllaries are thinner, whiter, broader and less pubescent than those of the typical form of *M. cynanchifolia*.—The plant was originally described as *M. scandens* * *periplocifolia* var. *intermedia* Malme, Kgl. Sv. Vidensk.-Akad. Handl. xxxii. no. 5, 35 (1899). Here appears to belong also *M. scandens* var. *periplocifolia* subvar. *mollis* Chodat, Bull. Herb. Boiss. ser. 2, iii. 712 (1903).

It is probable that this Forma *intermedia* of the Paraguay drainage will prove specifically separable from the true *M. cynanchifolia* of Argentina, Uruguay and southernmost Brazil. But until the latter is much better known, trustworthy diagnostic characters will be difficult to discover.

M. pilcomayensis (Hassl.), stat. nov. Inflorescence at length ovoid, the secondary corymbs borne on widely divergent pedicels (2–3 cm. in length); phyllaries obtusish, puberulent, 5 mm. long; pappus white. Leaves shallowly 3-lobed or even somewhat pentagonal in general contour, coarsely and bluntly toothed, the openly cordate base of the blade attached to the petiole by a conspicuous acumination.—*M. scandens* var. *pilcomayensis* Hassl. in Fedde Rep. Spec. Nov. xii. 368 (1913).—Paraguay: edge of woods, Onebrahachal on the lower reaches of the Pilcomayo River, *Rojas*, no. 268 (TYPE, in hb. of Dr. E. Hassler, phot. Gr.).

When visiting the Botanical Conservatory at Geneva in 1927, the writer was kindly permitted to examine and photograph this interesting plant, which seems fully to confirm Dr. Hassler's implied suspicion that it might prove a distinct species. It certainly shows no close relationship to the North American *M. scandens*, nor can it be

convincingly placed in any of the other here recognized segregates from this all too widely interpreted species. In inflorescence *M. pilcomayensis* shows a transition from § *Corymbosae* to § *Thyrsigerae;* while in leaf-contour, as Dr. Hassler well remarks, it suggests DeCandolle's Series *Angulatae*. As a readily recognizable Paraguayan endemic, thus far not known to intergrade with any other *Mikania*, it is certainly best treated as an independent species.

M. cordata (Burm. f.), comb. nov. Inflorescence at maturity an open corymbous panicle; pedicels mostly 3–5 mm. long; branchlets of the inflorescence angled or slightly winged at base; heads 7–7.5 mm. long; bractlets linear-filiform, about 3 mm. long; phyllaries linear, 6 mm. long, abruptly contracted to a short sharp point; corollas white; pappus-bristles 40–45, carneous to deeply rufous.—*Eupatorium cordatum* Burm. f. Fl. Ind. 176, t. 58 fig. 2 (1768). *E. volubile* Vahl, Symb. iii. 93 (1794). *Mikania volubilis* Willd. Sp. Pl. iii. 1743 (1804). —Eastern tropical Africa, the East Indies, Formosa, Philippines, Java, Borneo, etc.

When compared with the North American *M. scandens*, this wide-ranging plant of the Old World differs rather strikingly on account of its more open inflorescence, slightly larger heads, more abruptly pointed phyllaries and brownish pappus of which the bristles are perceptibly more numerous. There can be no reasonable doubt that this was the plant described by the younger Burman as *Eupatorium cordatum*. Hence the need for the new binomial here proposed.

To the synonymy of *M. cordata* there may be doubtfully referred the little known *M. scandens* var. *rhodotricha* Bak. in Mart. Fl. Bras. vi. pt. 2, 250 (1876). Interpreted from the Kew material of Gardner's no. 60, this plant has heads about 8 mm. in length, that is, slightly longer than those usually found in the *M. scandens* group. Furthermore, its pappus is not only a rather deep reddish brown as in *M. cordata* but is likewise composed of exceptionally numerous bristles (51–59). While Brazilian specimens of undoubted *M. micrantha* HBK. sometimes have a distinctly erubescent pappus, their heads are smaller, the pappus-bristles are less numerous, and the phyllaries are narrower and of slightly firmer texture than in the Gardener specimen in question. Finally the branchlets of the inflorescence in *M. micrantha* are nearly always perceptibly angled or winged on the outer side as they fork, which is not the case in Baker's var. *rhodotricha*. Until better known this seems best placed provisionally in the synonymy of *M. cordata*, with which it agrees in essentials.

There may here be indicated a series of plants, chiefly of the Greater Antilles but with outlying members in tropical Florida, at Panama, and in tropical Africa. They are manifestly related rather closely to *M. scandens*, but have for the most part smaller, more saliently angled, deeply toothed, lobed or even divided leaves. Though resting upon minor and to some extent variable characters and consequently difficult to key, these organisms are fairly recognizable plant-entities, no one of which can be satisfactorily merged either with the North American *M. scandens* or with any of the species treated above.

M. BATATAEFOLIA DC. Heads, phyllaries, corollas and pappus much as in *M. micrantha;* corymbs small (mostly 2–6 cm. in diameter), lax or dense, loosely disposed, long-peduncled from the upper axils; leaves small (mostly 3–4 cm. long and broad) deltoid-ovate, openly cordate or subcordate, conspicuously and usually hastately few-toothed or somewhat lobed, the lobes mostly short, widely divergent, subdeltoid.—Prod. v. 197 (1836). *M. deltoides* Poepp. as to plant so named by Poeppig but not the one described by Sprengel. *M. tamoides* DC. l. c., only a state in which the heads are less mature and the inflorescence in consequence seemingly more glomerate. *Willoughbya heterophylla* Small, Fl. S. E. U. S. 1170, 1338 (1903).—Cuba and the Keys of Florida.

M. RANUNCULIFOLIA A. Rich. Close to the preceding, but covered with a looser longer spreading pubescence and having the leaves not only somewhat larger (mostly 4.5–8 cm. long) but cleft fully half way to the midrib or base, the lobes being ovate and rounded at tip. —A. Rich. in Sagra, Cuba, xi. 45 (1850). *Willoughbya ranunculifolia* Millsp. in Field Col. Mus. Bot. ii. 106 (1900).—Cuba and Isle of Pines.

This and the preceding species, though as yet pretty readily separable in the scanty material at hand, are in essentials so close that transition is to be expected.

M. PANAMENSIS Robinson (see p. 41), as yet imperfectly known from a single rather immature specimen gathered by Pittier in the vicinity of Culebra, is also in most respects very similar to the West Indian *M. batataefolia.* However, it differs in several respects not as yet connected by known intermediates. It is more densely puberulent. The leaves seem to be of a slightly firmer texture and are more conspicuously dark-punctate. Its phyllaries, instead of being smoothish and pointed or even acuminate, are rather closely grayish-puberulent and very obtuse or even rounded at the shortly fringed summit. The heads in bud are rounded or subtruncate at the top, while at a corresponding stage of development those of *M. batataefolia* are acute or

even shortly acuminate. The rediscovery of this as yet little known plant of the Canal Zone is much to be desired.

M. CARTERI Bak. The type of this tropical African species was examined and photographed at Kew nearly thirty years ago. It rather closely resembles *M. ranunculifolia*, but is said to be sarmentose. Its leaves are of smaller size (scarcely over 3 cm. in diameter) and are suborbicular in general contour, being cleft palmately about half way to the middle into 3–7 irregularly toothed lobes of subequal length, while in *M. ranunculifolia* the leaves are somewhat triangular-ovate, the terminal lobe being decidedly longer than the lateral.—Kew Bull. 1895, p. 106 (1895).—Tropical east Africa.

M. CORYDALIFOLIA Griseb. A delicate twiner with leaves 3–5-parted nearly or quite to the base, the lobes mostly lanceolate, entire or again 1-lobed on one or both sides; inflorescence of small fastigiately branched corymbs (2–3 cm. in diameter), heads about 6 mm. long; ultimate bractlets linear-subfiliform, nearly as long as the oblong short-pointed phyllaries; corollas and pappus white.—Mem. Am. Acad. viii. 512 (1863). *Willoughbya corydalifolia* Ktze. Rev. Gen. i. 372 (1891).—Cuba.

This slender, nearly herbaceous plant may be readily distinguished by its very deeply parted or actually divided leaves with relatively narrow lobes or divisions.

M. TROPAEOLIFOLIA O. Hoffm. If rightly interpreted from Dinklage's no. 289, this plant of Cameroon in western tropical Africa is in habit and foliage very similar to the Cuban *M. corydalifolia*, but differs in having more shortly pedicelled or subsessile heads disposed in looser few-headed cymes. Its bractlets are also shorter, being scarcely a third as long as the phyllaries.—O. Hoffm. in Engl. Bot. Jahrb. xxiv. 468 (1898).—Cameroon.

In *M. scandens* and such of its close relatives as have been indicated above, the leaves are prevailingly of an ovate, ovate-oblong, deltoid or elliptic form, being normally more than half as wide as long. It is true an exception to this has been noted in the Paraguayan plant called *M. scandens* var. *sagittifolia* by Hassler. This, as stated above, is pretty clearly only a narrow-leaved phase of *M. periplocifolia*. However, there are two other plants of the general *M. scandens* affinity which should be mentioned here and which have strikingly narrow, arrow-shaped leaves, only about a third as wide as long. These are:

M. DUSENII Robinson. A smooth twiner with leaves that are con-

spicuously attenuate to a very sharp apex and have a base which, though sagittate in general form, has at the attachment a small suborbicular bay nearly enclosed by the deflexed basal lobes.—Contrib. Gray Herb. xcvi. 24 (1931).—Southern Brazil and northeastern Argentina.

In inflorescence, involucral and floral characters, this rather striking plant is disturbingly close to *M. micrantha*, yet in leaf-form it is so exceedingly different that convincing evidence of intergradation must be observed before its reduction to varietal or formal rank would be justified.

M. sagittifera, spec. nov., gracilis volubilis ut videtur herbacea perennis breviter griseo-hirsutula; caule subtereti brunnescenti; foliis oppositis graciliter petiolatis anguste triangularibus gradatim ad apicem acutissimum attenuatis lateraliter breviter undulato-denticulatis vel (saltim supremis) subintegris basi sagittatis 5–9 cm. longis 1.5–3 cm. latis; petiolo 1–2 cm. longo; corymbis convexis plerisque 2–4 cm. diametro longe pedunculatis irregulariter ramosis; bracteis angustissimis integris attenuatis; pedicellis plerisque 2–3 mm. longis; bracteolis linearibus; capitulis ca. 8 mm. longis; involucri squamis lanceolato-oblongis acutis subherbaceis dorso griseo-hirsutulis ca. 5 mm. longis; corollis pallidis verisimiliter albis; achaeniis 2.6–2.8 mm. longis atrobrunneis in faciebus glandulari-atomiferis in angulis glabris; pappi setis carneis.—Kabulabula, on the Chobe River, Bechuanaland, July 1930, *van Son*, no. 28,729 (TYPE, in the Gray Herbarium), collected by the Vernay-Lang Kalahari Exped.

In all probability this is the same as the plant collected in water along the margin of the Longa River above the Lazingua in southeastern Angola by von Baum and named *M. scandens* forma *angustifolia* by O. Hoffmann in Warburg, Kunene-Sambesi Exped. 405 (1903) and later rediscovered in Rhodesia at Victoria Falls by the Swedish Rhodesia-Congo Exped. and raised to specific rank, as *M. angustifolia* by R. E. Fries in his admirable report on the botanical investigations of this expedition, i. pt. 2, 328–9, fig. 38 a & b (1916)—a name which would have been gladly taken up but for the fact that it has the earlier homonym *M. angustifolia* HBK. Nov. Gen. et Spec. iv. 138 (1820) and would therefore, according to the present International Rules of Botanical Nomenclature, be invalid.

As neither the plant of von Baum nor that of the Swedish Expedition has been available for study during the preparation of the present paper and as in any event the name *angustifolia* would have to be abandoned, it has seemed best to draw a new description from the material at hand, so that the species in question may have correct

nomenclatural status under its new name, which could scarcely have been the case, if it were based on unverified synonymy.

The primary object of this little series of notes is to provide a rational application for a dozen or more names now available to relieve the much overworked *M. scandens*. It may be thought that a key should have been furnished, but the group is one in which the plant-entities, though on study pretty readily recognizable, are to be interpreted each rather by the habitual association of minor and often variable traits than by the presence of any character sure to hold and therefore appropriate for use in a key.

Of the African species not as yet studied from sufficient material to determine satisfactorily their degrees of relationship to the other members of the *M. scandens* group, there may be mentioned *M. chenopodifolia* Willd. of Sierra Leon, *M. oxyota* DC. of southeastern Africa and *M. natalensis* DC. Of these the first two are described as nearly or quite glabrous, while *M. natalensis* has a short but almost velvety pubescence. All three are said to have rufescent pappus and, so far as examined by the writer, would appear to have white corollas. Certainly no one of these plants can be satisfactorily placed in the North American *M. scandens*, which as we have seen has normally white pappus and roseate or purplish corollas. The African members of this affinity, of which presumably some are still undescribed, are certainly in need of clearer delimitation among themselves and sharper definition on the side of the East Indian *M. cordata*, which in fact seems to be present also in tropical Africa.

Mikania deltoides Poepp. and *M. cissampelina* DC. are further names which have at times been associated with *M. scandens*, both of them in connection with plants of the Greater Antilles. Some comment on their application seems here desirable, since the writer fails to find himself in accord with their disposition by the late Professor Urban in the synonymy of his for the most part exceedingly helpful treatment of the West Indian Mikanias.

M. deltoides Poepp. ex Spreng. Syst. iii. 423 (1826). Urban, Symb. Ant. v. 233 (1907), asserts with marks of affirmation that this was *Eupatorium havanense* HBK. Nov. Gen. et Spec. iv. 128 (1820). This may well be true of the material described by Sprengel, who placed the plant in a series of erect and shrubby species and states that its leaves were paler beneath. However, though Sprengel in the hurried compilation of his Systema may have blunderingly placed in the genus *Mikania* a *Eupatorium* with many-flowered heads,

Poeppig certainly knew the difference between these genera. Therefore it is not surprising to find at the Natural History Museum in Vienna among the admirable series there representing Poeppig's plants a delicate twining *Mikania* with deltoid-ovate deeply cordate and coarsely toothed leaves and bearing the original label stating it to be "*Mikania deltoides* Pp. Cuba, 1823. Poeppig." As Poeppig never published the plant and as the species was mistakenly associated by Sprengel with a previously characterized *Eupatorium* and therefore given a wholly misleading description, the name *M. deltoides* Poepp. has no nomenclatural importance whatever.

M. cissampelina DC. Prod. v. 195 (1836) has remained a problematic plant. DeCandolle's diagnosis is brief and calls for a glabrous plant with obtuse entire leaves and with heads 5 lines (i. e. 1 cm.) in length. Though the species is said to have come from Santo Domingo, no collector, date, number or more precise locality is mentioned.

The only published comment on the identity of *M. cissampelina* seems to be the one found in Urban's treatment of the West Indian Mikanias, where in his Symb. Ant. v. 230 (1907) it is referred to *M. scandens* L. but said to be a form with floral parts and achenes larger than those of the common form.

Feeling certain that no entirely glabrous plant with heads 1 cm. long could be satisfactorily included in *M. scandens* L., the writer has endeavored to gain further light on the type-material of *M. cissampelina*, and through the very kind and effective assistance of Dr. Hochreutiner, Director of the Conservatory of Botany at Geneva, who has sent detailed information, and of Mr. J. Francis Macbride, who most obligingly prepared and forwarded several exceedingly clear photographs of the type-sheet, it is now possible to record the following facts.

On the type-sheet of *M. cissampelina*, labelled in hand of DeCandolle, there are mounted about ten pieces, of which most show a bit of stem, a leaf or two, and a partial inflorescence. Of these pieces, the one at the upper right and another at the lower left of the sheet doubtless represent the plant from which DeCandolle drew his description; for in fact they show a plant with cordate obtuse leaves and with heads fully 1 cm. long. It may be remarked, however, that the plant is not wholly glabrous, being on the contrary finely pubescent. Nor are the leaves quite entire, since the margins are shallowly crenate-undulate.

This plant on the type-sheet, which may be styled Element A and must be regarded as the source of the description, is unquestionably M. CORDIFOLIA (L. f.) Willd.

The other scraps of material mounted on the same sheet have deltoid-ovate acuminate somewhat hastately toothed leaves and bear heads about 8 mm. long. They also are somewhat pubescent and seem uniform with each other. This part of the material, which may be styled Element B, clearly belongs to the *M. scandens* group but certainly not to the real *M. scandens* L. of North America. From the rather deeply tawny pappus and from the form, size and position of the bractlet, the writer would infer that these scraps of Element B came possibly from Brazil but more probably from some part of the Old World and were referable to M. CORDATA (Burm. f.) Robinson rather than to any of the other segregates of *M. scandens* here described.

Therefore, it is probable that this Element B, which happily does not have any nomenclatural significance in the interpretation of *M. cissampelina*, is merely some non-pertinent material by oversight subsequently mixed during the mounting with the original plant stated by the label to have been collected in Santo Domingo by Coulon in 1802, and referable, as we have seen, to *M. cordifolia*.

IV. STUDIES IN THE BROMELIACEAE,—V.

By Lyman B. Smith.

(*Plates I–III.*)

The present paper is chiefly the result of studies made in the summer of 1933 in the herbaria of the Royal Botanic Gardens at Kew (K), the British Museum of Natural History (BM), and Cambridge University (Cam). I am also indebted to the following institutions and individuals for lending me important material or procuring photographs or duplicates for me: the United States National Museum (US), the New York Botanical Garden (NY), the Field Museum of Natural History (FM), the Missouri Botanical Garden (Mo), the University of California (Cal), the Berlin Herbarium (B), the National Museum of Prague, the Rijks Herbarium of Leiden, the Botanical Museum of Munich (Mun), the National Museum of Natural History of Buenos Aires (BA), and Don Cornelio Osten of Montevideo, Uruguay (Ost).

I am obliged to Mr. J. E. Dandy of the British Museum and to Dr. T. A. Sprague of the Kew Herbarium for important suggestions on nomenclatorial points. Dr. Castellanos of the National Museum of Buenos Aires and Don Cornelio Osten have given me much helpful

advice on the *Bromeliaceae* of northern Argentina and adjacent regions.

In making new combinations, I am publishing only those which have been necessitated by the process of determining material. In other cases it seems better to wait until the validity of the species can be checked by an examination of the types.

Ananas comosus (L.) Merrill var. **microstachys** (Lindm.), comb. nov. *A. microstachys* Lindm. in Svensk. Ak. Handl. xxiv. no. 8, 39, t. 7, fig. 20–23 (1891). *A. sativus* var. *microstachys* Mez in Mart. Fl. Bras. iii. pt. 3, 294 (1892).

In accepting Merrill's combination as the correct name for the common pineapple of cultivation, it becomes necessary to have a new combination to designate the primitive wild variety.

Aregelia, see **Neoregelia.**

Bakerantha, nom. nov. *Bakeria* André, Rev. Hort. lxi. 84 (1889), non Seem. (1864).

Bakerantha tillandsioides (André), comb. nov. *Bakeria tillandsioides* André, ibid.

Catopsis (**Eucatopsis**) **cucullata**, spec. nov., acaulis: foliis rosulatis, tenuibus, ad 22 cm. longis, minutissime punctato-lepidotis; vaginis late ellipticis sed haud distinctis; laminis subtriangularibus, acutis apiculatisque, basi 2 cm. latis: scapo decurvo, vaginis late ovatis, acutis, internodia superantibus: inflorescentia simplici vel paupere paniculata, pendula; in inflorescentia paniculata bracteis primariis late ovatis, acutis, quam spicae suberectae multo brevioribus: spicis ad 10 cm. longis; bracteis florigeris suberectis, late ovatis, acutis, 10–15 mm. longis, flores bene superantibus, apice cucullato-incurvis, tenuibus, nervatis, obscure punctato-lepidotis vel glabris: floribus hermaphroditis; sepalis late obovatis, asymmetricis, 10 mm. longis; petalis quam sepala paulo longioribus; staminibus manifeste inaequalibus; stylo brevissimo. Pl. III, figs. 3–5.

MEXICO: Vera Cruz: Banderilla, Jilotepic, Jalapa, alt. 1300–1550 m., 1888, *Com. Geogr. Explor. Rep. Mex. 366* (FM, type; G).

This species is unusual for *Catopsis* in having its flowers hooded by the bracts. The flowers are perfect but the stamens are distinctly unequal. This combination of characters conflicts with the generally accepted definition of the subgenus *Eucatopsis*, but in the case of at least two species the definition is obviously in error. Hooker's illustration of *Tillandsia nitida* in the Exotic Flora t. 218 has been cited as the original of a species assigned to *Eucatopsis*, yet the figure plainly shows the stamens unequal. Harms illustrates another species of the subgenus, *Catopsis nutans*, with the same character of unequal

stamens.[1] Obviously the relative lengths of the stamens must be abandoned as a distinction between the two subgenera of *Catopsis*.

Dyckia Meziana Kuntze. This little-known species is illustrated here to show its more important technical characters and to give a comparison with the nearly related *D. pulquinensis* Wittm. Pl. III, figs. 11–13.

Dyckia microcalyx Bak. var. **Ostenii**, var. nov., foliis haud ultra 20 cm. longis, margine fortiter spinosis; lamina basi ad 3 cm. lata: inflorescentia laxa, in typo simplici: floribus magnis; sepalis ad 6 mm. longis. Pl. III, fig. 16.

ARGENTINA: MISIONES: on rocks on the banks of the Yguazú, Yguazú Falls, 1915, *Osten & Rojas 8097* (Ost, TYPE; phot. G).

Dyckia pulquinensis Wittm. The closest relative of this species is *D. Meziana* Kuntze, not *D. hamosa* Mez as Wittmack suggested. *D. hamosa* has the stamens included while *D. pulquinensis* and *D. Meziana* have them conspicuously exserted, and are practically identical in habit. In fact there is little to distinguish the two species except the form of the petals, and until further material appears it will always be a question whether the distinction really holds. Pl. III, figs. 6–10.

Guzmania R. & P. In a previous paper[2] I noted the apparent weakness of the distinction between *Guzmania* and *Sodiroa* but owing to an almost complete lack of material of the latter genus I refrained from reducing it for fear that there might be better distinctions as yet unnoted. Since that time I have examined the types of seven of the eight species of *Sodiroa* and an isotype of the eighth, and am now convinced that *Sodiroa* does not merit generic rank.

In the first place *Sodiroa* is not homogeneous, and to retain it even as a section or subgenus it would be necessary to remove *S. dissitiflora* and *S. Sprucei*. Their sepals are cucullate and closely convolute at anthesis, as in *Guzmania musaica*, not straight and flaring as in typical *Sodiroa*. Furthermore they are not caulescent, although the caulescent habit has been considered as characterizing all species of *Sodiroa*.

In the second place *Sodiroa* in its original sense has only its flaring sepals to distinguish it from *Guzmania*. The caulescent habit long thought to be distinctive of *Sodiroa* is shown equally well by *Guzmania angustifolia* which has sepals quite unlike *Sodiroa*. It is hard to see why flaring sepal-blades should separate *Sodiroa* from *Guzmania*,

[1] Harms in Engl. & Prantl, Nat. Pflanzenf. 2 Aufl., xv a. 131, fig. 48 D (1930).

[2] Contrib. Gray Herb. xcviii. 19 (1932).

when flaring petal-blades full as conspicuous fail to separate *Phytarrhiza* from *Tillandsia*.

The following brief synopsis will serve to make the necessary transfers and illustrate the relations of the species in the typical *Sodiroa* group, while adding citations previously unnoted:

1. Inflorescence subcorymbose: flowers closely aggregated.
   2. Sepals 3–7 cm. long: leaf-blades with several strong nerves.
      3. Leaf-sheaths deep chestnut-brown.
         4. Sepals triangular-acute. Colombia.....*G. Pearcei.*
         4. Sepals broadly obtuse. Costa Rica, Colombia.....*G. obtusiloba.*
      3. Leaf-sheaths but little darker than the blades. Colombia.....*G. caricifolia.*
   2. Sepals not more than 2 cm. long: leaf-blades with a single strong median nerve. Colombia.....*G. graminifolia.*
1. Inflorescence spiciform. Colombia.....*G. Kalbreyeri.*

G. Pearcei (Bak.), comb. nov. *Sodiroa Pearcei* Bak. Journ. Bot. xxv. 53 (1887).

COLOMBIA: Cauca: western Andes of Popayan, alt. 1400–1800 m., *Lehmann 5306* (B, phot. G).

G. obtusiloba, nom. nov. *Sodiroa Andreana* Wittm. Pl. Lehm. in Engl. Bot. Jahrb. xi. 57 (1889), non *Guzmania Andreana* Mez in DC. Mon. Phan. ix. 936 (1896).

COSTA RICA: La Hondura de San José, alt. 1300 m., 1933, *Valerio 702* (FM, phot. G).

G. caricifolia (André), comb. nov. *Sodiroa caricifolia* André ex Bak. Journ. Bot. xxv. 53 (1887).

G. graminifolia (André), comb. nov. *Sodiroa graminifolia* André ex Bak. Journ. Bot. xxv. 54 (1887). *S. Trianae* Mez in DC. Mon. Phan. ix. 888 (1896).

It should be noted that while André gave *S. caricifolia* and *S. graminifolia* as the only species when he described *Sodiroa* in Bull. Soc. Bot. France, xxiv. 167 (1877), he said specifically that he was not going to describe the species until later.

Mez's description of the peculiarly abrupt transition from sheath to blade in the scape-bracts of *S. graminifolia* allows him to separate *S. Trianae*, but an examination of the types shows the two species to be identical, and the strange bracteal characters merely the result of drying and inrolling inaccurately observed.

G. Kalbreyeri (Bak.), comb. nov. *Sodiroa Kalbreyeri* Bak. Brom. 141 (1889).

G. dissitiflora (André), comb. nov. *Sodiroa dissitiflora* André, Enum. 5 (1888).

G. Sprucei (André), comb. nov. *Sodiroa Sprucei* André, Enum. 5 (1888). *G. rosea* L. B. Smith in Contrib. Gray Herb. cii. 147 (1933). In *G. Sprucei* the leaves are ligulate and the sepals are about 5 cm. long, while in *G. dissitiflora* the leaves are narrowly triangular and the sepals are only about 3 cm. long. The character of relative length of bracts and sepals formerly used to distinguish these species has become quite useless with the appearance of material additional to the types.

G. angustifolia (Bak.) Wittm. *G. caulescens* Mez & Sodiro in Bull. Herb. Boiss. ser. 2, v. 112 (1905). The typical material of *G. angustifolia* as shown at Kew varies from very short-caulescent to distinctly caulescent, but the leaves are never truly rosulate. This eliminates any distinction for the later *G. caulescens*.

G. Cornuaulti (André) Mez. This species must be excluded from *Guzmania* henceforth. See under **Tillandsia Turneri.**

G. gloriosa André. *G. columnaris* Mez & Sodiro, Bull. Herb. Boiss. ser. 2, v. 113 (1905). *G. gloriosa* should not have been transferred to *Thecophyllum*.[1] André dissected and sketched the type when he collected it, and his illustration in Brom. André, t. 17, figs. C1 and 3 clearly shows a gamopetalous naked corolla. He described it as "breviter trilobata." Unfortunately the flowers have deteriorated so badly that it is impossible to check André's findings, but until he is proven wrong it would seem unwise to contradict the statement of so careful and accurate an observer as he.

In my provisional key to *Guzmania*,[2] *G. gloriosa* runs down to 33. *G. columnaris* from whose description it shows no essential distinction. *G. gloriosa* is now known from the following material:

COLOMBIA: CALDAS: epiphytic in forest, "Pinares," above Salento, alt. 2800–3100 m., 1922, *Pennell 9362* (G). ECUADOR: PICHINCHA: Perucho, near Quito, alt. 1830 m., 1876, *André 3791* (K, TYPE; phot. G); woods, west of Mt. Pichincha, *Sodiro 45* (hb. Mez, type of *G. columnaris*, not seen).

G. longipetala (Bak.) Mez. A dissection of the flowers of this species shows a gamopetalous naked corolla, indicating that it should be retained in *Guzmania*, not in *Thecophyllum*. As the floral bracts are somewhat shorter than the sepals the species runs down to *G. acorifolia* in my key. It differs from that species in its very elongate primary bracts, 2-flowered spikes and membranaceous floral bracts.

Lindmania Mez. The following synopsis includes several changes in taxonomy and brings the treatment of the whole genus up to date:

[1] Mez in Bull. Herb. Boiss. ser. 2, iii. 131 (1903).
[2] Contrib. Gray Herb. xcviii. 19 (1932).

1. Flowers neither secund nor nutant.
  2. Inflorescence tripinnate.
    3. Inflorescence arachnoid, amply tripinnate.
      4. Stamens longer than the petals.....1. *L. Pearcei.*
      4. Stamens shorter than the petals: leaf-blades serrulate toward base.....2. *L. albicans.*
    3. Inflorescence subglabrous, barely tripinnate: leaves entire, petiolate.....3. *L. petiolata.*
  2. Inflorescence scantly bipinnate, glabrous: leaves not at all constricted between sheath and blade.....4. *L. guianensis.*
1. Flowers secund or nutant, usually both.
  5. Leaf-blades serrulate, at least toward base.
    6. Leaf-blades serrulate for most of their length, pungent: scape-bracts serrulate: flowers 5 mm. long.....5. *L. Weddelliana.*
    6. Leaf-blades serrulate only toward base, filiform-acuminate: scape-bracts entire: flowers 3 mm. long .....6. *L. Rusbyi.*
  5. Leaf-blades entire.
    7. Inflorescence arachnoid to villous: floral bracts acuminate, mostly longer than the pedicels.
      8. Inflorescence merely arachnoid: floral bracts not much longer than the pedicels.....7. *L. micrantha.*
      8. Inflorescence densely villous: floral bracts more than twice as long as the pedicels.....8. *L. villosula.*
    7. Inflorescence glabrous: floral bracts merely acute, mostly shorter than the pedicels.
      9. Flowers scarcely 5 mm. long.....9. *L. Weberbaueri.*
      9. Flowers 8–9 mm. long.
        10. Sepals obtuse: leaves up to 25 cm. long.....10. *L. penduliflora.*
        10. Sepals acute: leaves much shorter.....11. *L. gracilis.*

1. **L. Pearcei** Mez in DC. Mon. Phan. ix. 537 (1896). *Cottendorfia Pearcei* Bak. Brom. 128 (1889).

BOLIVIA: near Butuco, July 1865, *Pearce* (BM, TYPE; phot. G).

I do not know why Mez considered that this specimen came from Colombia. The label gives no other locality than "Butuco" which I have been unable to find, but at the date given, Pearce must have been in Bolivia judging by the data on other specimens.

2. **L. albicans** (Griseb.) Mez in DC. Mon. Phan. ix. 537 (1896). *Cottendorfia albicans* Griseb. Symb. Argent. 330 (1879).

ARGENTINA: SALTA: Dept. Oran, Barranco de Rio Blanco near the Rio Seco below San Andres, 1873, *Lorentz & Hieronymus 502* (NY, B, phot. G); *288* (NY).

3. **L. petiolata** Mez, Bull. Herb. Boiss. ser. 2, iv. 864 (1904).

PERU: PUNO: terrestrial in forest, near Tambo Isillame on the way from Sandia to Chunchusmayo, alt. 1000 m., *Weberbauer 1210* (B, TYPE; not seen).

4. **L. guianensis** (Beer) Mez in DC. Mon. Phan. ix. 537 (1896). *Anoplophytum guianense* Beer, Brom. 44 (1857).

BRITISH GUIANA: BERBICE: upper Corentyne River, *Schomburgk 20* (K, phot. G); *1564* (Mez!).

5. **L. Weddelliana** (Brongn.) Mez in DC. Mon. Phan. ix. 538 (1896). *Cottendorfia Weddelliana* Brongn. ex Bak. Brom. 129 (1889).

BOLIVIA: La Paz: prov. Yungas, damp meadows, *Weddell 4233* (Paris, TYPE; not seen).

6. **L. Rusbyi** Mez in Engl. Bot. Jahrb. xxx. Beibl. 67, 6 (1901).

PERU: Cuzco: Pumachaca, Santa Ana Valley, alt. 1400 m., 1931, *F. L. Herrera 3316* (G). BOLIVIA: La Paz: Noryungas, subtropical region, Polo-Polo near Coroico, alt. 1100 m., 1912, *Buchtien 3674* (NY); Prov. Yungas, *Bang 2571* (NY, TYPE; G, FM, K).

It should be noted that the collector of the type of this species was Bang, and not Rusby as given in the original description.

7. **L. micrantha** (Lindl.), comb. nov. *Pitcairnia micrantha* Lindl. Bot. Reg. xxix Misc. 44 (1843). *Cottendorfia neogranatensis* Bak. Brom. 129 (1889). *Lindmania neogranatensis* Mez in DC. Mon. Phan. ix. 538 (1896). *L. flaccida* Standl. in Journ. Wash. Acad. Sci. xiii. 364 (1923).

MEXICO: Oaxaca: Sierra Madre, 1927, *K. Reiche 566a* (Mun, phot. G). SALVADOR: Ahuachapán: moist shaded bank, vicinity of Ahuachapán, alt. 800–1000 m., 1922, *Standley 19786* (US, type of *L. flaccida;* G, NY). COLOMBIA: without further locality, *Jurgensen 389* (K, type of *L. neogranatensis;* phot. G). BRAZIL: Federal District: Rio de Janeiro, 1841, *C. Smith* (cult. Cam, TYPE; phot. G).

Hitherto *Pitcairnia micrantha* Lindl. has been assigned to the synonymy of *P. suavcolens* Lindl., but from the description alone it is quite evident that this could not be the case with the flowers of *P. micrantha* so much smaller. The origin of the type is rather open to doubt, since the plant was discovered only after its arrival in England and may not have come from Brazil as supposed. However, even if it did, the resulting range would not be wholly without precedent in the family and later collections may show a more nearly continuous range. Until quite recently *Lindmania* was not known outside of South America. Then Standley extended its known range north to Salvador, and now the appearance of Reiche's specimen establishes it in southern Mexico.

8. **L. villosula** Harms, Notizblatt, x. 794 (1929).

BOLIVIA: La Paz: on rocks, Beni River Valley, alt. 1000 m., 1921, *Rusby 393* (NY); Cochabamba: Incachaca to San Antonio, alt. 1600 m., 1926, *Werdermann 2120* (B, TYPE; phot. G).

9. **L. Weberbaueri** Mez in Fedde Rep. Spec. Nov. xii. 417 (1913). *Cottendorfia Rusbyi* Bak. in Bull. Torrey Bot. Club, xxix. 697 (1902), not *Lindmania Rusbyi* Mez (1901).

PERU: JUNÍN: wooded slope, La Merced, alt. 600–700 m., 1923, *Macbride 5352* (G, FM); dense forest, Rio Paucartambo Valley, near Perene Bridge, alt. 700 m., 1929, *Killip & Smith 25326* (US, NY); AYACUCHO: Prov. Huanta, on rocks at margin of rain forest, 1910, *Weberbauer 5635* (B, TYPE; phot. G). BOLIVIA: LA PAZ: Yungas, alt. 2000 m., 1885, *Rusby 2541* (NY, type of *Cottendorfia Rusbyi;* phot. G).

10. **L. penduliflora** (C. H. Wright) Stapf in Bot. Mag. cl. t. 9029 (1924); Castellanos in An. Mus. Nac. Hist. Nat. B. A. xxxvi. 52, t. 3 (1929). *Catopsis penduliflora* C. H. Wright in Kew Bull. 197 (1910).

PERU: without further locality, *Forget* (K, TYPE). ARGENTINA: SALTA: Oran, Rio Blanco, alt. 600 m., 1928, *Venturi 7600* (G); Tartagal, 1925, *Schreiter 26/1232 in hb. BA* (Castellanos!); JUJUY: Sierra Santa Barbara, San Pedro, alt. 750 m., 1929, *Venturi 9721* (G, NY).

11. **L. gracilis** (Rusby), comb. nov. *Catopsis gracilis* Rusby in Bull. N. Y. Bot. Gard. vi. 489 (1910).

BOLIVIA: LA PAZ: Guanai, alt. 500 m., 1901, *R. S. Williams 738* (NY, TYPE; phot. G); near Santa Ana, Bopi, alt. 500 m., 1921, *O. E. White 1086* (NY).

L. brevifolia (Griseb.) Hauman = ABROMEITIELLA BREVIFOLIA (Griseb.) Castellanos. See Castellanos in An. Mus. Nac. Hist. Nat. B. A. xxxvi. 371 (1931).

L. chlorantha (Speg.) Hauman = ABROMEITIELLA BREVIFOLIA (Griseb.) Castellanos. See Castellanos, ibid.

Neoregelia, nom. nov. *Aregelia* Mez in DC. Mon. Phan. ix. 4, 61 (1896), non O. Kuntze. Kuntze proposed *Aregelia* as a nomen novum for *Nidularium*, so that its typification must be identical with that of *Nidularium*. Consequently it is not allowable to use *Aregelia* for a genus segregated from typical *Nidularium* as Mez did. The substitution of *Neoregelia* for the *Aregelia* of Mez includes the following new combinations:

N. ampullacea (E. Morr.), comb. nov. *Nidularium ampullaceum* E. Morr. Belg. Hort. xxx. 242 (1880). *Aregelia ampullacea* Mez in DC. Mon. Phan. ix. 64 (1896).

N. concentrica (Vell.), comb. nov. *Tillandsia concentrica* Vell. Fl. Flum. 134 (1825), Icones, iii. t. 133 (1827). *Aregelia concentrica* Mez in DC. Mon. Phan. ix. 81 (1896).

N. eleutheropetala (Ule), comb. nov. *Nidularium eleutheropetalum* Ule, Verhandl. Bot. Ver. Brandenb. xlviii. 131 (1907). *Aregelia eleutheropetala* Mez ex L. B. Smith in Contrib. Gray Herb. xcviii. 5 (1932).

N. laevis (Mez), comb. nov. *Aregelia laevis* Mez, Fedde Rep. Spec. Nov. xii. 411 (1913).

N. Morreniana (Ant.), comb. nov. *Karatas Morreniana* Ant. Phyto-Iconogr. t. 35 (1884). *Aregelia Morreniana* Mez in DC. Mon. Phan. ix. 72 (1896).

N. sarmentosa (Regel), comb. nov. *Nidularium sarmentosum* Regel, Gartenflora, xix. 268 (1870). *Aregelia sarmentosa* Mez in DC. Mon. Phan. ix. 66 (1896).

Var. **chlorosticta** (Bak.), comb. nov. *Karatas chlorosticta* Bak. Brom. 7 (1889). *Aregelia chlorosticta* Mez in DC. Mon. Phan. ix. 65 (1896).

N. spectabilis (Moore), comb. nov. *Nidularium spectabile* Moore in Gard. Chron. 8 (1873). *Aregelia spectabilis* Mez in DC. Mon. Phan. ix. 70 (1896).

Pitcairnia Archeri, spec. nov., brevissime caulescens, 7 dm. alta: foliis quaquaversis, minutissime perobscureque punctulato-lepidotis, dimorphis, exterioribus squamiformibus, late ovatis, integris, interioribus fere 1 m. longis, super vaginam in petiolum elongatum spinoso-serratum contractis, lamina lanceolata, integra, ad 6 cm. lata: scapo erecto, bracteis ellipticis obtecto: inflorescentia simplicissima, dense spicata; bracteis florigeris late ellipticis, fulgide rubris, dense imbricatis, subcoriaceis: floribus sessilibus; sepalis linearibus, nullo modo carinatis, ad 4 cm. longis, quam bracteas florigeras multo longioribus, ab initio albis, mox apici nigrescentibus; petalis intus nudis, verisimiliter per anthesin quam sepala brevioribus. Pl. III, figs. 20–21.

COLOMBIA: Chocó: terrestrial, La Concepción, 15 km. east of Quibdo, alt. ca. 75 m., 1931, *W. A. Archer 2078* (US, TYPE; phot. G).

This species is unusual in combining sessile flowers with exserted sepals, and also in having cleistogamous flowers. Probably it should be placed in *Neumannia*, although such action would necessitate a redefinition of that subgenus.

Puya Herzogii Wittm. At one time I was inclined to reduce this species to the synonymy of *P. Brittoniana* because it was evidently conspecific with the Kuntze specimen cited by Mez under that species. However, on locating the type of *P. Brittoniana*, I find it quite distinct from the Kuntze specimen. Thus *P. Herzogii* remains a valid species and its occurrence, thus far evident, is as follows:

BOLIVIA: La Paz: prov. Inquisivi, rocky hillsides, Pongo de Quime, alt. 3800–3900 m., 1921, *O. E. White 197* (NY, G); Cochabamba: Tunari Mt., alt. 3600 m., 1892, *Kuntze* (NY, phot. G); at tree line above Incacorral, alt. 3300 m., 1911, *Herzog 2269* (Leiden, TYPE; B, phot. G).

Puya nana Wittm. It is difficult to believe that this species is not a *Greigia* until one dissects a flower, so close is the habital simi-

larity. It is by far the most extreme case of reduction of floral axes in the whole genus. Pl. III, figs. 14–15.

Tillandsia Barclayana Bak. in Journ. Bot. xxv. 239 (1887). *T. lateritia* André, Enum. 6 (1888); Brom. André, 76, t. 21 (1889). The following material convinces me that *T. Barclayana* and *T. lateritia* are not specifically distinct:

ECUADOR: Los Rios: epiphytic, in tropical zone, Sabanetas, 1876, *André 4057* (K, type of *T. lateritia;* phot. G); Guayas: woods of Valdivia, 1836, *Barclay 622* (BM, type; phot. G); epiphytic, Balao, 1892, *Eggers 14582* (Mun); Oro: Portovelo (Gold Mine near Zaruma), alt. 600–1000 m., 1923, *Hitchcock 21247* (G).

Tillandsia Castellani, spec. nov., saxicola, distincte caulescens, florifera usque ad 15 cm. alta, verisimiliter pulvinata: caule ramoso: foliis caulem distiche vaginantibus, ad 45 mm. longis; vaginis latissime ovatis, valde nervatis, extus dense lepidotis, margine ciliato-lepidotis; laminis sublinearibus, teretibus, 2–3 mm. in diametro, pungentibus, dense pruinoseque cinereo-lepidotis: scapo manifesto, terminali vel pseudoaxillari, nudo, glabro, gracili: inflorescentia 1–2-flora; bracteis florigeris ovatis, late acutis, glabris, valde nervatis, quam sepala bene brevioribus: sepalis aequaliter subliberis, lanceolatis, obtusis vel late acutis, ad 9 mm. longis, glabris, nervatis; petalis stylo staminibusque ignotis: capsula anguste cylindrica, 15–25 mm. longa. Pl. III, figs. 17–19.

ARGENTINA: Córdoba: Capilla del Monte, Los Paredones, 1922, *Castellanos 1576* (G, type); same, alt. ca. 1000 m., 1918, *Osten 13474* (Ost); Cuesta de Atlantina, 1921, *Castellanos* (G); San Luis: Quebrada de Ramo in San Francisco, 1925, *Castellanos 25/618 in hb. BA* (G).

It is indeed a pleasure to dedicate this species to Dr. Alberto Castellanos, who has not only done much himself to advance the knowledge of Argentine *Bromeliaceae*, but has also been extremely generous in extending help to others.

Tillandsia Castellani probably belongs to the section *Diaphoranthema*, in which case it is related to the group of species centering on *T. myosura*, but differs at once in having the floral bracts distinctly shorter than the sepals. It is also possible that it might belong in section *Phytarrhiza* in the vicinity of *T. crocata*, but this is less likely. Here again the relatively short floral bracts are distinctive.

Its characters are suggestive of a cross between *T. myosura* and *T. capillaris*, but the specimens appear too uniform for such a hybrid origin.

Tillandsia didisticha Bak. in Journ. Bot. xxvi. 16 (1888). *Guzmania complanata* Wittm. Mededell. Rijks Herb. xxix. 92 (1916). As

already noted in Contrib. Gray Herb. xcviii. 34 (1932), Wittmack's species could scarcely belong to *Guzmania*. An examination of the type of *Guzmania complanata* shows that the petals have run together in drying so as to simulate a gamopetalous corolla, yet the claws are definitely overlapping and may be separated by careful dissection. They were obviously distinct when fresh.

The sepals may be either glabrous or quite plentifully lepidote or any stage in between in *T. didisticha*. In *Herzog 1201*, the type of *Guzmania complanata*, they are plentifully lepidote.

Tillandsia Leiboldiana Schdl. in Linnaea, xviii. 414 (1844). *T. lilacina* Mez in DC. Mon. Phan. ix. 806 (1896). *Tillandsia Leiboldiana* was originally described as having its stamens included, and it undoubtedly belongs to the section *Allardtia* although Mez placed it under *Platystachys* in his monograph. In returning the species to *Allardtia* no good specific distinction appears to separate the later *T. lilacina*.

Tillandsia paleacea Presl, Rel. Haenke. i. 125 (1827). *T. fusca* Bak. in Journ. Bot. xvi. 240 (1878). *T. scalarifolia* Bak. in Journ. Bot. xxv. 235 (1887). *T. Schenckiana* Wittm. in Engl. Bot. Jahrb. xi. 63 (1889). *T. lanata* Mez, Bull. Herb. Boiss. ser. 2, v. 109 (1905). *T. favillosa* Mez in Fedde Rep. Spec. Nov. iii. 43 (1906). Pl. II.

The identity of *Tillandsia paleacea* has long been in doubt, although the original description was full enough to give an idea of its probable relationships. Recently through the kindness of the National Museum at Prague I have received a photograph of the type collected in Chile by Haenke. From the photograph it is immediately evident that it is a wide-spread somewhat variable Andean species which has been passing under a number of names. The later names of course must lapse, since the material to which they have been applied now proves confluent.

Tillandsia (§ **Platystachys**) **pueblensis**, spec. nov., acaulis, 16–24 cm. alta: foliis rosulatis, dense pruinoseque griseo-lepidotis, exterioribus reductis, interioribus ad 16 cm. longis, saepissime recurvatis; vagina vix distincta, lamina anguste triangulari, basi ca. 10 mm. lata, involuta, pungenti: scapo erecto, brevi, vaginis inferioribus foliaceis, longe laminatis, vaginis superioribus lanceolatis, acutis, membranaceis, appresse lepidotis: inflorescentia simplicissima, linearilanceolata, laxe 5–7-flora, ad 9 cm. longa, 1 cm. lata; bracteis florigeris stricte erectis, anguste lanceolatis, acutis, imbricatis sed rhachin haud obtegentibus, 25–30 mm. longis, membranaceis, valde nervatis, appresse griseo-lepidotis, pulchre rubris: floribus subsessilibus; sepalis anguste lanceolatis, acutis, 20 mm. longis, membranaceis, nervatis,

carinatis, posticis inter sese ad 6 mm. connatis; petalis violaceis, 4 cm. longis, tubulose convolutis; staminibus styloque exsertis. Pl. III, figs. 1–2.

MEXICO: Puebla: Zapotitlan, 1912, *Purpus 5856* (G, type; FM, Mo, Cal).

In Mez's monograph this species keys down to *T. sublaxa*, from which it differs in its pruinose-lepidote leaves, lepidote floral bracts and connate posterior sepals.

Tillandsia Rusbyi Bak. Brom. 176 (1889). *T. Buchtieni* H. Winkler in Fedde Rep. Spec. Nov. vii. 107 (1909).

Tillandsia Turneri Bak. in Journ. Bot. xxvi. 144 (1888). *T. Cornuaulti* André, Enum. 8 (1888); Brom. André, 102, t. 33 (1889). *Guzmania Cornuaulti* André ex Mez in DC. Mon. Phan. ix. 925 (1896). A careful examination of *André 1764*, the type of *Tillandsia Cornuaulti*, shows that André was quite correct in considering it a *Tillandsia*. He illustrated the spike as distichous, a character unknown in *Guzmania*, to which Mez transferred it following some ms. of André. To be sure the spike portrayed had so few flowers that their ranking was not so evident as it might be, but the specimen itself shows much larger spikes and these are definitely distichous.

It is also significant that André's original sketch, made doubtless from fresh material, shows a corolla of distinct and naked petals.

The type of *T. Cornuaulti* agrees closely with that of *T. Turneri* which is the earlier name by some months. The primary bracts are relatively much larger in *T. Cornuaulti* but this is probably just because it is a young specimen as indicated by the undeveloped state of the petals shown by André.

Vriesia drepanocarpa (Bak.) Mez in DC. Mon. Phan. ix. 581 (1896). *Tillandsia drepanocarpa* Bak. in Journ. Bot. xxvi. 41 (1888). *Vriesia Dusenii* L. B. Smith in Contrib. Gray Herb. xcviii. 17, t. 5, fig. 3–4 (1932). Both Baker and Mez erred in their description of the type of *Vriesia drepanocarpa*, when they called the inflorescence simple. As a matter of fact the inflorescence consists of six spikes of two fertile flowers each, and what Baker and Mez considered floral bracts are in reality primary bracts. For a complete description of the species see under the later *V. Dusenii*. By the addition of *V. Dusenii* to its synonymy, *V. drepanocarpa* extends its range to include the state of Paraná as well as that of São Paulo. Pl. I.

Explanation of Plates.

Plate I.

Vriesia drepanocarpa (Bak.) Mez (*Burchell 3596*), habit, showing compound inflorescence.

Plate II.

Tillandsia paleacea Presl (*Haenke s. n.*), habit and enlarged inflorescence.

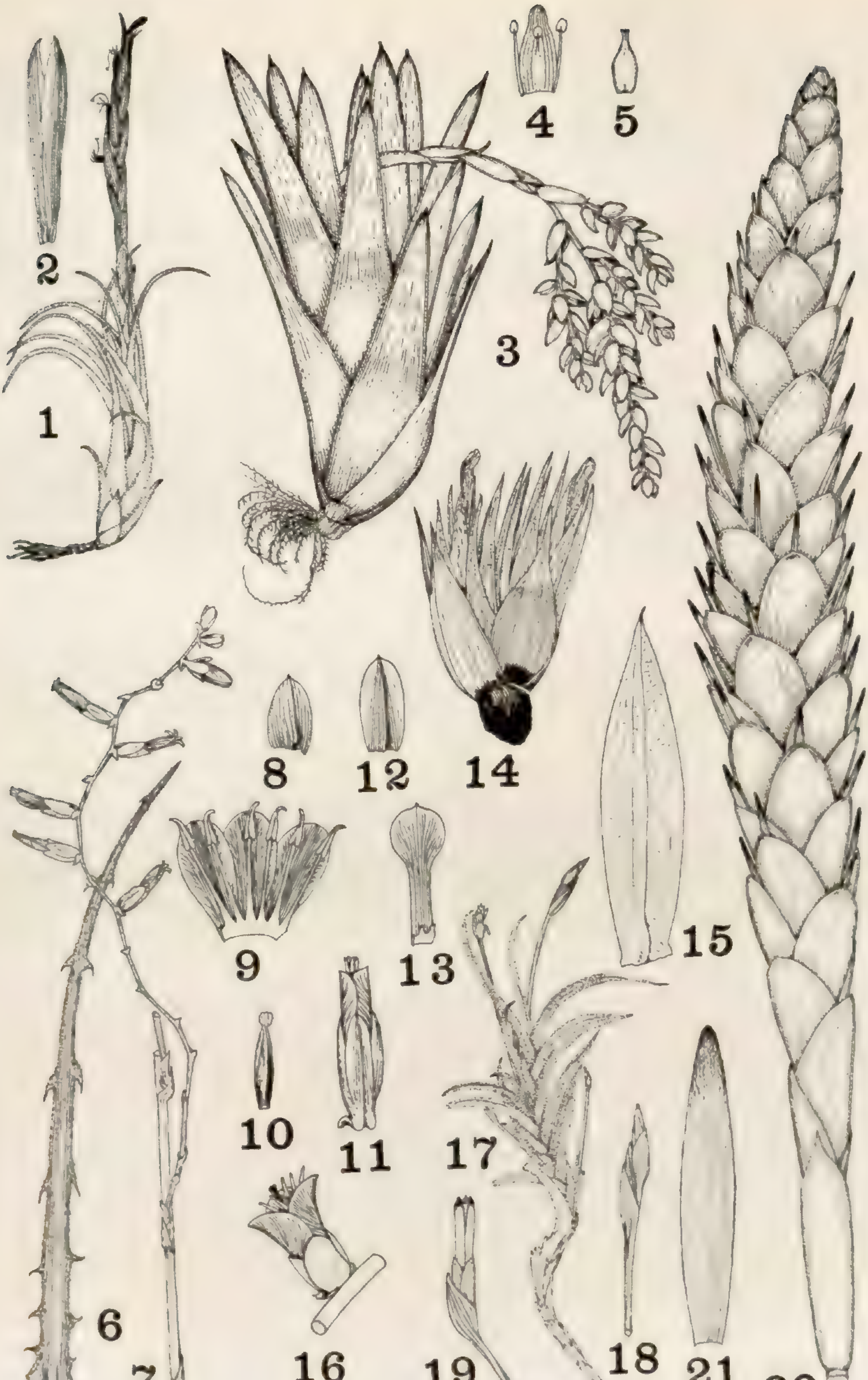
Plate III.

Fig. 1. Tillandsia pueblensis L. B. Smith (*Purpus 5856*), habit × ¼.
2. Same, posterior sepals × 1.
3. Catopsis cucullata L. B. Smith (*Com. Geogr. Explor. Rep. Mex. 366*), habit × ¼.
4. Same, petal and stamens × 1.
5. Same, pistil × 1.
6. Dyckia pulquinensis Wittm. (*Herzog 1849*), leaf × ½.
7. Same, section of inflorescence × ½.
8. Same, sepal × 1.
9. Same, corolla and stamens × 1.
10. Same, pistil × 1.
11. Dyckia Meziana Kuntze (*O. Kuntze s. n.*), flower × 1.
12. Same, sepal × 1.
13. Same, petal × 1.
14. Puya nana Wittm. (*Herzog 1856a*), inflorescence × ½.
15. Same, sepal × 1.
16. Dyckia microcalyx Bak. var. Ostenii L. B. Smith (*Osten & Rojas 8097*), flower × 1.
17. Tillandsia Castellani L. B. Smith (*Castellanos 1576*), habit × ½.
18. Same, young spike × 1.
19. Same, fruiting spike × 1.
20. Pitcairnia Archeri L. B. Smith (*Archer 2078*), inflorescence × ½.
21. Same, sepal × 1.

Specimen in monographia Bromeliacearum citatum.
Vriesea drepanocarpa Bak
Benth. similisque Var. amethystinae, E. Kor.
det. Carl Mez 1894.

VRIESIA DREPANOCARPA (Bak.) Mez.

TILLANDSIA PALEACEA Presl.



Figs. 1–2, TILLANDSIA PUEBLENSIS L. B. Sm.; 3–5, CATOPSIS CUCULLATA L. B. Sm.; 6–10, DYCKIA PULQUINENSIS Wittm.; D. MEZIANA Kuntze; 14–15, PUYA NANA Wittm.; 16, DYCKIA MICROCALYX Bak. var. OSTENII L. B. Sm.; 17–19, TILLANDSIA CASTELLANI L. B. Sm.; 20–21, PITCAIRNIA ARCHERI L. B. Sm.

DRABA ALPINA: FIG. 1, flowering plant, × 1, from Norway; FIG. 2, small fruiting plant, × 1, from Torne Lappmark; FIG. 3, portion of rosette, × 10, from fig. 2; FIG. 4, summit of scape, × 10, from fig. 2.

D. ALPINA, var. NANA: FIG. 5, fruiting plant, × 1, from Mansfield Island, Hudson Bay (isotype of *D. Bellii*); FIG. 6, flowering plant, × 1, from Thule, northwest Greenland; FIG. 7, leaves, × 10, from fig. 6.

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OF HARVARD UNIVERSITY

CV

DRABA IN TEMPERATE NORTHEASTERN AMERICA

By M. L. FERNALD

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DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. Fernald

(Plates 290–319)

Introduction

In the northeastern United States the genus *Draba* is only slightly developed and without taxonomic difficulty; but northeastward, on the Gaspé Peninsula, in western Newfoundland and on the Labrador Peninsula, the genus begins to show some of the diversities and complexities which, in cordilleran North America, Europe, boreal and alpine Asia and the Arctic, render its satisfactory classification most difficult. The recent studies of types of arctic American species by Mrs. Elisabeth Ekman,[1] the studies of Asiatic species by Pohle[2] and the ostensibly world-wide (but chiefly Eurasian) monograph of *Draba* by O. E. Schulz[3] have made it opportune, or at least desirable, to attempt to set our own Drabas in order. For her very painstaking

[1] Elisabeth Ekman: *Nomenclature of some North-European Drabae*, Arkiv. f. Bot xii. no. 7: 1–17, t. 1 (Nov., 1912); *Hvad är Draba hirta L.?*, Bot. Notiser (1913), 183–192 (1913); *Zur Kenntnis der Nordischen Hochgebirgs-Drabae*, Kgl. Svenska Vet.-Akad. Handl. lvii. no. 3: 1–68, tt. 1–3 (1917), ser. 3, ii. no. 7: 1–56, tt. 1–3 (1926); *Studies in the Genus Draba*, Svensk. Bot. Tidskrift, xxiii. 476–495 (1929); *Contribution to the Draba Flora of Greenland.* II, ibid, xxiv. 280–297, t. iii (1930); *Contribution*, etc. III, ibid, xxv. 465–495, t. v (1931); *Contribution*, etc. IV, ibid, xxvi. 431–447 (1932); *Contribution*, etc. V, ibid, xxvii. 97–103 (1933); *Contribution*, etc. VI, ibid, xxvii. 339–346 (1933).

[2] R. Pohle, *Drabae asiaticae*, Fedde, Repert. Beiheft, xxxii. 1–225 (1925).

[3] O. E. Schulz in Engler, Pflanzenr. iv[196] (1927).

search for the historic type-specimens of the Greenland and other arctic species and for her critical discussions of them we owe gratitude to Mrs. Ekman, who has been able to clarify many formerly obscure situations.

The inherent difficulty of the group, however, coupled, it would seem, with lack of clarity in definition, is peculiarly emphasized by Schulz's treatment. To use his keys, whether to the sections or within the sections, with possibility of arriving at even a doubtfully satisfactory identification, one needs to have had much experience in following down false leads and in successively trying another and another, until eventually some sort of "identification" is achieved. Such misleading and carelessly constructed keys are altogether too familiar in the work of certain Americans; they are not at all confined to European taxonomy, although the sum-total of inadequate and discouraging keys in *Das Pflanzenreich* is disproportionately large. A few illustrations, taken chiefly from species of our eastern American flora, will clearly bring out the inadequacy of these keys.

In the Shickshock Mountains of Gaspé there occurs a densely humifuse and matted, glabrous plant (PLATE 292)[1] with naked, filiform scapes a few centimeters high, which has erroneously passed as *Draba fladnizensis* Wulfen or as the closely related *D. lactea* Adams or *D. fladnizensis*, var. *heterotricha* (Lindbl.) Ball (PLATE 291). The plant is one of four scapose species found (thus far) about the Gulf of St. Lawrence, the others being the well-known stellate-pubescent *D. nivalis* Liljeblad (PLATE 295, FIGS. 1–3), another but apparently undescribed species (PLATE 295, FIGS. 4–7) also with stellate pubescence, as yet known only from a single collection, and the strongly hispid *D. rupestris* R. Br. (PLATE 293), likewise known near the Gulf of St. Lawrence from a single station only. In the present connection the important point to note is, that these plants are normally scapose, only very exceptionally with 1 or 2 small bracteal leaves, the filiform scapes usually only 1–10 cm. high. Consequently, a botanist without uncanny intuition or without special forewarning would inevitably look for them all under the 1st main division of the genus in Schulz's treatment.

A. Caules floriferi aphylli, scapiformes.

But, alas, not one of them, nor the species to which Schulz refers them, is treated by him in the scapiform group! On the contrary, all

[1] This paper being originally published in parts, the plates may not occur in the installments where occasionally cited.

DRABA FLADNIZENSIS, var. HETEROTRICHA: FIG. 1, small flowering plant, × 1, from Thule, northwest Greenland; FIG. 2, fruiting plant, × 1, from Labrador; FIG. 3, tips of leaves, × 10, from fig. 1; FIGS. 4 and 5, valve and septum, × 10, from Torne Lappmark.

four of the species to which these tiny scapose plants have been referred are found extensively treated under

B. Caules floriferi ± foliosi.

This is the more disconcerting since the monographer correctly describes *D. nivalis* with "Caules filiformes, . . . aphylli vel monophylli," *D. rupestris* with "Caules tenuissimi, aphylli vel monophylli" and *D. fladnizensis* with "Caules . . . aphylli vel sub flore imo folio unico praediti"; and in his fig. 28,J he shows the latter with 5 entirely naked scapes and 2 with a bract subtending the lower pedicel; while in his fig. 25,H he correctly illustrates *D. lactea* with absolutely leafless scapes. The only species of our area (in northern Labrador) admitted by Schulz to his "**A.** Caules floriferi aphylli, scapiformes" is *D. alpina* L. (PLATE 290); but its very remote segregation in the key from the others is not made clear by the essentially identical descriptive phrase, in the specific treatment, "Caules . . . plerumque aphylli, rarius monophylli." The fundamental trouble, of course, is the altogether too common one of trying to build mutually exclusive keys upon a single inconstant character, without giving warning of exceptions, as a careful systematist would endeavor to do. This reliance upon single inconstant characters is found, also, in the keys to species within the artificially separated sections.

One other illustration, this based on undoubted members of group "**B**," is illuminating. One of the comparatively frequent species of easternmost Quebec, Newfoundland and Labrador is the biennial *D. incana* L. (PLATE 299), often with excessively leafy flowering stem, the crowded leaves up to 95 in number: "foliis numerosis (usque ad 50 vel etiam ad 95 . . .) valde approximatis"—Schulz, l. c. 285. One would, therefore, promptly key it (Schulz, l. c. 19) to

I. Caules foliis multis densifolii . . . Sec. XII. **Phyllodraba,**

a section in which Schulz places our *D. aurea* M. Vahl (PLATE 296), with "Caules . . . crebre (8–16-) foliati" (which is not a very large number) but, also, the Japanese *D. Sakuraii* Makino with "Caules . . . 3–6-phylli," the Colorado *D. crassa* Rydb. (*D. chrysantha* Wats., 1882, not C. Koch, 1847) with "Caules floriferi . . . paucifolii" (the specimens have 1–5 leaves), the Californian *D. corrugata* Wats., well illustrated by Schulz, his fig. 23, showing the few leaves of the primary axis (as in Watson's type) 0.5–1 cm. or more apart (not well described by Schulz's sectional "Caules foliis multis densifolii") and, finally, the New Mexican *D. mogollonica*

Greene, with "Folia . . . caulina . . . pauca (1–3), remota"!! But, *D. incana* "foliis numerosis (usque ad 50 vel etiam ad 95 . . .) valde approximatis" is not placed by Schulz in § *Phyllodraba*. Instead, it is exhaustively treated and over-divided in § XIV. **Leucodraba**, under the call

II. Caules foliis paucis remotis paucifolii.

The preceding instances illustrate the difficulty of interpreting correctly Schulz's sectional groupings of *Draba*, at least those represented in North America. Similar difficulties, most unfortunately, are met in coordinating the specific diagnoses with the key-characters given by him. For example, in sect. *Leucodraba* the key to subsect. *Holarges* (pp. 204–206) is of vast importance to students of the boreal floras. The first division is

a. Siliculae ellipsoideae,

as opposed to

b. Siliculae oblongae vel lineares.

Nevertheless, species covered in the key only under "a. Siliculae ellipsoideae" (nec "oblongae vel lineares") are further defined as follows: *D. hirta*, "Siliculae ex ovato lanceolatae" (p. 204); *D. subamplexicaulis*, "Siliculae . . . . oblongae" (p. 273); *D. daurica*, "Siliculae . . . oblongae" (p. 274); *D. arabisans*, "Siliculae . . . lineari-lanceolatae, semper acuminatae" (p. 275); *D. Henneana*, "Siliculae . . . oblongae vel ex ovato oblongae" (p. 276); *D. mongolica*, "Siliculae . . . ovoideae vel anguste lanceolatae, acutae" (p. 278); *D. sachalinensis*, "Siliculae ovato-lanceolatae, . . . ad apicem in stylum . . . attenuatae" (p. 281); *D. incana*, "Siliculae . . . lanceolatae vel oblongae" (p. 283): etc. The inclusion in the key of numerous species as having siliques ellipsoid, as opposed to oblong or linear, and then the further definitions of them as having the siliques oblong, ovoid, lanceolate or linear-lanceolate and acuminate or attenuate (surely not ellipsoid) is such evident contradiction and leads to such inevitable perplexity that one wonders if the many European admirers of Schulz's work have actually faced the problem of using his keys. Schulz's descriptions of species and his bibliography are of remarkably high quality; it is, therefore, the more to be regretted that his keys are so misleading. To some of us, who have long worked in taxonomy, the test of monographic work is the accurate construction of the keys; unless the keys unlock the doors it is impossible to enter.

This extreme difficulty or impossibility of arriving surely at a correct identification by trying to follow the keys in Schulz's monograph is not the only reason for my boldness in attempting to work out some sort of recognizable classification of our Drabas. The group is a most interesting element in the more localized or isolated floras of northeastern America and its geographic as well as taxonomic relationships are important to understand. Furthermore, the full content of the *Draba* flora of the temperate latitides of eastern North America has been most inadequately appreciated. The greatest development of the genus in America is, of course, in the cordilleran region, with the Arctic next; but in the area covered by Gray's *Manual*, thence east to Newfoundland and north across the Labrador Peninsula or south into Georgia, we now know at least 25 true species, and several more are doubtless present.

The utter inadequacy of treatments of *Draba* for the area just defined becomes emphasized when it is noted that in Schulz's monograph ONLY 135 SPECIMENS in the entire genus are cited from the area above defined, and those are largely of the well known annual and biennial species of the South (*D. caroliniana* Walt., *D. cuneifolia* Nutt., *D. brachycarpa* Nutt., etc.). However, in the Gray Herbarium alone (to say nothing of the Canadian National Herbarium, the herbarium of the University of Montreal, the United States National Herbarium, and numerous other large herbaria in the Eastern States, which would more than double the number) the single species, *D. arabisans* Michx., is represented by 154 sheets; while *D. glabella* Pursh (*D. hirta* of most eastern American authors, including *D. Henneana* of Schulz's treatment and *D. daurica* of Mrs. Ekman's) has 137 sheets.

For all of North America (excluding Greenland) Schulz cites only a single atypical (and apparently not conspecific) number (PLATE 303, FIG. 1) from the Gaspé Peninsula to represent *D. norvegica* Gunner (PLATE 301); yet the Gray Herbarium alone exhibits 87 sheets or numbers of *D. norvegica* from Newfoundland and Quebec Labrador! Again, *D. rupestris* R. Br. (PLATE 293) is recognized by Schulz only from Scotland and the Faeröes. Nevertheless, had he done what a monographer of a world-wide genus should be expected to do, namely, visited the larger American herbaria before writing with quasi authority on American plants, the author would have found at the easternmost of the great herbaria (the Gray Herbarium) plants from Newfoundland (PLATE 293, FIG. 2) and Labrador (FIG. 3) which seem quite

inseparable from authentic specimens (FIG. 1) from the type-locality of *D. rupestris*, Ben Lawers in Scotland, except that they are sturdier.

Unfortunately, one can hardly feel that the treatment of *Draba* in *Das Pflanzenreich* shows any more understanding of American plants than has been indicated for other groups by writers of certain treatments in some other volumes in the series. The prevalent European assumption that American plants can be adequately known and understood without visiting and studying the large American herbaria, where the bulk of American specimens are, naturally, preserved and where European visitors would be most cordially welcomed, is one of the greatest fallacies of much Old World taxonomic publication, ostensibly of world-wide scope. It is, I realize, a thankless and unappreciated, if not quite useless task for a mere American to point out weaknesses in the work of some European taxonomists (and other botanists);[1] but, surely, the publications in Europe on American groups would be less open to just criticism if their sponsors would see to it that only the most scholarly work, based upon a truly adequate understanding of the plants and upon ability clearly to present the results, were published. It requires a degree of assurance, which most of us lack, and an opportunity to study extensively in the greater herbaria all over the world, an opportunity which comes to few, properly to prepare the specialist for a monograph of world-wide scope. Such a fortuitous combination of requirements is not common and, perhaps, has never been achieved, but it is certainly not too much to expect that those who undertake cosmopolitan monographs should make some effort to meet these elementary requirements.

Some years prior to the World War, the author of one of the voluminous German monographs (of a genus with 400–500 species in North America) wished, what was obviously out of the question (as wholly crippling work at the lending institution), to borrow many thousands of irreplaceable sheets (including all types) of his assigned group from the Gray Herbarium. Being then a bachelor, with a

[1] The late Charles Baron Clarke, F.R.S., F.L.S., one of the most prolific writers on the *Cyperaceae*, once wrote: "All papers, at least of a systematic kind, prepared in Asia, Africa, or America, must be, as literary work [he omitted to say "as systematic work"], very poor performances in the eyes of botanists in the herbaria of London, Paris, and Geneva [for some reason omitting Berlin]."—C. B. Clarke, Journ. Linn. Soc. Bot. xxi. 2 (1884). To one who has some familiarity with *Carex* in North America it is appalling to see how thoroughly the more technical groups of American *Carex* (like the *Ovales*) were misidentified and with what notes of assurance they were mislabelled by Clarke in the herbarium at Kew.

larger proctorial suite of rooms than I needed, I invited my German colleague to spend two or three months in Cambridge as my personal guest. His reply intimated a reason which, unfortunately, limits the possibilities of broad outlook everywhere: "Mit besten Dank bescheinige ich Ihren den Empfang Ihres Briefes. . . . Lebhaft bedauere ich *vorerst* nicht persönlich Ihre Bekanntschaft in Cambridge machen zu koennen, wir haben in Deutschland Geld für alles, nur nicht für die Wissenschaft."

Even the best of European taxonomic work on groups largely American, conscientiously done by a master of the group, loses much of its implied completeness and authority when, owing to neglect of all except a few continental herbaria, its author fails to study many thousands of American specimens which would clarify his understanding and make his work more truly cosmopolitan. Thus, in Niedenzu's potentially great monograph of the largely American family (seven-eighths American) *Malpighiaceae* there is, as Gleason has already clearly pointed out, "extraordinary and astounding neglect of American material." As Gleason, further, quite justly says, "a visit to America is certainly not too much to expect of the author of a volume for such a dignified and ostensibly authoritative work as the Pflanzenreich. . . . . Finally, it seems that the present author would be informed and all future authors in the Pflanzenreich warned that there are two large herbaria in London and several large herbaria in the Americas, all of which contain much material of importance in the monographing of any group of plants."[1] Dozens (on the average) of American taxonomists annually visit the larger herbaria of Europe for study of types and authentic material. The European taxonomist, one would suppose, would find it absolutely essential to visit the greater American herbaria, if he expects adequately to understand American plants or if he hopes to have his outputtings on American groups respected by American botanists

[1] Gleason, Review of Niedenzu's *Malpighiaceae*, Torreya, xxx. 101–103 (1930).

The very natural and human but unfortunate tendency to attempt world-monographs from a wholly provincial viewpoint is not new. The pantropical genus *Smilax* has great development in southeastern Asia (including French Indo-China) and in eastern America. In view of the amazingly important and voluminous collections from these areas accumulated at the Muséum d'Histoire Naturelle in Paris (and elsewhere), the following passage, written in Geneva in 1878, by Alphonse and Casimir DeCandolle is significant: "Les Smilacées ont été l'object de deux très-bons travaux. . . . Kunth, dans le cinquième volume de son *Enumeratio*, publié en 1850, a décrit très-soigneusement les espèces, du moins celles qu'il voyait dans son herbier, dans celui de Luca ou dans l'herbier royal de Berlin, car il ne mentionne aucune des autres grandes collections, pas même celles de Paris où il a résidé si longtemps."—A. & C. DC., Mon. Phan. i. 2 (1878).

as satisfactory world-treatments. By crossing the Atlantic and making use[1] of our important herbaria he would, also, give us an opportunity to reciprocate the many courtesies and attentions we so regularly receive when we visit the Old World botanical centers.

Greater intercourse between the taxonomists of the Old World and the New would do much further to remove or to modify the once disdainful attitude toward American herbaria and botanical publication and the once frequent assumption of finality of botanical knowledge and of its monoply in limited areas, above referred to. With a less restricted conception of the physiographic, consequently botanical, diversity of regions outside Eurasia the following incident of a not very distant past would hardly recur. A sumptuous Old World monograph of a large boreal genus recognizes but 2 species in Newfoundland, each represented by a single specimen seen. We now know 9 species in that country, represented by nearly 100 numbers in the Gray Herbarium alone. Twenty years after the publication of the monograph I wrote its author, offering to send material of additional species. The reply was: "Ich fürchte dass ich nicht 6–8 Arten aus Newfoundland werde anerkennen können. Ich habe bis heute, obwohl ich viel neues Material in der Hand hatte, keinen Grund gefunden, von dem in meiner Monographie angenommenen Artenumfang abzugehen." If the perfectly frank author here quoted had seen the larger American herbaria, his outlook would have been quite different; at least, he would have had the opportunity for new light.

After openly regretting the weaknesses in the work on American species of the most prolific writer on the *Cruciferae*, it is perhaps unseemly to venture a paper on so difficult a group as *Draba*. It is, however, with full realization of the difficulties but with the hope of at least somewhat clarifying our understanding of our own plants that the present synopsis is presented; only by painstakingly working out the species in natural areas can we attain the proper bases for world-monographs. The lines drawn between species, for instance between *D. rupestris* (PLATE 293) and *D. norvegica* (PLATES 301, 302), when fuller experience justifies, may have to be modified or abolished. In a group where morphological characters of flower and seed are almost wanting and where habit and character of pubescence are more than usually depended upon that is inevitable.

[1] I do not mean to imply that the bulk of specimens in American herbaria can be divided and shared, as one European visitor has repeatedly requested.

The names, likewise, may eventually need some alteration. Without the most intensive understanding of the plants and the most intelligent comparison of adequate series of specimens with the type-specimens, when they can be located, there is constant danger of going astray. In many cases I have been forced, at least for the present, to accept the verdicts of others, especially Mrs. Ekman, Pohle and Schulz, regarding such identities. As pointed out, however, in the discussion of *D. glabella* (PLATES 307–312) Mrs. Ekman recently (1917) asserted with some confidence that the boreal plant which has oftenest (but erroneously) passed as *D. hirta* L. is not that Linnean species, but is a series of boreal subspecies and varieties of the Patagonian *D. magellanica* Lam.; the plants with pubescent siliques being *D. magellanica,* subsp. *cinerea* (Adams) Elis. Ekm. with its var. *dovrensis* (Fries) Elis. Ekm.; those with glabrous siliques *D. magellanica,* subsp. *borea* Elis. Ekm. Very soon, however, she withdrew two of the boreal plants from the Patagonian, her *D. magellanica,* subsp. *cinerea* again (and rightly, it seems to me) becoming (1929) *D. cinerea* Adams (1817) and her *D. magellanica,* subsp. *borea* identified (1930), correctly, with *D. daurica* DC. (1821); but *D. magellanica,* var. *dovrensis* was left unchanged, except that Mrs. Ekman finally considered it a hybrid of *D. daurica* and *D. cinerea,* an origin hardly probable .for the true Patagonian *D. magellanica.* Through the generosity of my former student. Mr. J. Francis Macbride, I have a photograph and detailed account of the type of *D. daurica* DC. (1821), PLATE 308, FIG. 3. Through the great kindness of Prof. J. Milbraed, Curator of the Botanical Museum at Berlin-Dahlem, the actual type (PLATE 308, FIG. 2) of *D. Henneana* Schlechtendal (1836) is before me. Through Mrs. Ekman and Dr. Porsild I have many sheets identified by Mrs. Ekman as *D. daurica* (1821) and as *D. magellanica,* var. *borea* (1917). So far as I can make out they are conspecific; but a still earlier name has been overlooked. *D. glabella* Pursh (1814), with an unfortunately misleading name for a plant with stellate pubescence on rosette-leaves, stem, cauline-leaves and sometimes the siliques!, was based on a specimen in the Banks Herbarium, from Hudson Bay. The excellent photograph (PLATE 308, FIG. 1) of it kindly supplied by Mr. Ramsbottom, Keeper of Botany in the British Museum, with detailed notes on all technical characters by his associate, Mr. Exell, leaves no question that *D. glabella* (1814) is conspecific with the others and antedates them all, except *D. magellanica* Lam. (1786), with which I am not convinced that the boreal plants are conspecific.

I have, unhappily, been obliged to point out the inadequacy of certain European work upon the American species of *Draba* and some other groups. Another disconcerting tendency, especially of some Swedish students, is to see hybrids in every plant they do not promptly understand. Floderus, following this wholly hypothetical and very dubious course, has treated nearly all Greenland *Salices* as hybrids. Few representatives of species are found, according to him, in Greenland. It is, consequently, astounding that so many of the Greenland specimens of *Salix* should be inseparable from common plants of the coast of Labrador, northwestern Newfoundland and Gaspé, where at least one of the hypothetical parents assigned by Floderus for the Greenland plants does not occur. Along the same line, Mrs. Ekman has marked a large proportion of the specimens, which she did not understand, in the National Herbarium of Canada as hybrids or probable hybrids of far-distant parents.

As an illustration of this easy but specious method of solving the identity of a plant I may cite no. 1920 of the Canadian National Herbarium, originally distributed as *Draba aurea* M. Vahl, from sand and gravel, Little Charlton Island, James Bay, July 14, 1887, *J. M. Macoun*. The three plants on the sheet at Ottawa are passing from flower to fruit, showing the short and thick, strictly terminal racemes, the long soft pilosity of the 20 ± crowded cauline leaves and the stems, the characteristic retrorse villosity of the silique, the long style (1 mm. long) and the golden petals which at once characterize *D. minganensis* (Victorin) Fernald (PLATES 297, 298), a species with three areas of extreme localization: the Mingan Islands, north of Anticosti; cliffs of Bic, Rimouski Co., Quebec; and limestone islands of James Bay. Yet Mrs. Ekman, not knowing Canadian Drabas from field-experience, labels the Little Charlton Island plant "*Draba aurea* M. Vahl, f., potius hybrida: *D. aurea* × *daurica* (an = *D. arabisans* Michx.)."

The white-flowered *Draba daurica* (i.e. *D. glabella*), with closely pannose-stellate pubescence on leaves and stems and with only 1–5 cauline leaves, and glabrous to sparsely stellate-hirtellous siliques with styles barely 0.5 mm. long (see PLATE 307), occurs in all the areas of *D. minganensis* but its relationship to that species is merely geographic. *D. arabisans* (PLATES 314, 315) is an endemic of eastern North America, with the pubescence of basal foliage and stem minutely stellate-pannose, the 3–12 cauline leaves scattered, the siliques glabrous and the petals white. It has no close relationship to *D.*

DRABA ALLENII, n. sp.: FIG. 1, portion of flowering plant, × 1; FIG. 2, portion of fruiting plant, × 1; FIG. 3, leaves, × 10; FIG. 4, flowers, × 10; FIGS. 5 and 6, valve and septum, × 10; all from Shickshock Mts., Quebec.

minganensis nor has it ever been found either on the Mingan Islands or about James Bay, where it should be expected if it has there produced stable and fully fertile offspring. As for *D. aurea*, that very characteristic species of the North (PLATE 296), is the only one of the three hypothetical parents of Mrs. Ekman's supposed hybrid which is related to *D. minganensis*. It is at once distinguished, however, by the slender and very elongate, leafy-bracted raceme. Furthermore, it is quite unknown about the Gulf of St. Lawrence and, consequently, can hardly have helped give rise to the Mingan and Bic colonies of the very characteristic *D. minganensis*.

Just as this is going to press another of Mrs. Ekman's interpretations of an endemic American species comes to hand. Lest to those who do not know the plants concerned or American geography or who do not check the statements of fact it may seem that I am overstressing the absurdities which the hybridophile will fail to see, I am here quoting Mrs. Ekman's complete statement.

Draba arabisans Michx.

In the year 1911, on my first visit to the Copenhagen Herbarium, the late Professor OSTENFELD had the kindness to show me a specimen of *D. arabisans* Michx. which had been obtained from MICHAUX' countryman, DESFONTAINES, and might possibly be regarded as a second-type. It was not until 1927 that I had an opportunity to see and examine MICHAUX' type in the Musée du Jardin des Plantes in Paris. I then found, that the type-specimen in every respect agreed with DESFONTAINES's plant and that the two plants probably had once belonged to the same tuft. The stalks of MICHAUX' own type were perhaps a little taller, at least one of them, which was somewhat branched at the top.

When examining the specimens of *D. aurea* in the Copenhagen Herb., in 1931, I was struck by the correspondence which I found to exist between certain of the aforesaid hybridous forms of *D. aurea* and the specimen of *D. arabisans* Michx. donated by DESFONTAINES. Through a microscopical examination of the latter I have been convinced of the identity of this form with the hybrid of *D. aurea* × *daurica*. To the naked eye the fruits of *D. arabisans* looked glabrous, but under the microscope a few hairs were found in the margin of the valves of some of them. The cruciate hairs on the leaves of *D. arabisans* are shorter and more branched than those of *D. aurea*. The style is shorter than that of *D. aurea* but longer than that of *D. daurica*, the pedicels longer and more spreading than in the latter species and the raceme consequently broader; the pods are slightly twisted. The cauline leaves are of an intermediate number, viz. 6–7 on each stalk, and the stalks are bare between the upper cauline leaf and the lowest pedicel. . . .

MICHAUX' diagnosis is very incomplete, but one characteristic deserves to be remembered, viz. the pointed styles. This may mean that the pods are pointed at the apex, a characteristic which agrees with the pods of both *D. arabisans* and *D. aurea*. *D. arabisans* was collected by MICHAUX

in the Hudson Bay area ("Hudson Strait") and there both *D. aurea* and *D. daurica* are to be found. It is a pity that no distinct proof can be given of the hybridogenity of *D. arabisans*. One has only to study all intermediate forms between *D. aurea* and *D. daurica*, and among them there will probably be found some that agree with the type of *D. arabisans*. Some forms, labelled *D. arabisans* by American botanists, resemble closely *D. daurica*, and are possibly derived from a second crossing, viz. between *D. arabisans* and *D. daurica*. In the specimens found by Messrs A. E. & R. T. PORSILD in 1928 at the Great Bear Lake, the characteristics from *D. aurea* were, however, present, though latent and not obvious.

And finally I only wish to propound: E. GREENE described *D. praealta* with white flowers in Pittonia III (1898), p. 306. In the Manual of Botany of Centr. Rocky Mountains by J. M. COULTER and AVEN NELSON (1909), p. 222 *D. lapilutea* (which according to RYDBERG and SCHULZ is the same plant) is described with yellow flowers. Is this plant possibly also a form of the hybrid of *D. aurea* × *daurica*, of which *D. arabisans* seems to be one? *D. praealta* has been regarded as an annual or biennial plant, but some specimens in the herbaria, for instance no. 22875 in the National Herbarium of Ottawa, which was collected by J. W. BELL in 1900, are obviously perennials.[1]

It is most distasteful to be unable always to agree with others; it is most unfortunate that some whom we should like to accept as authoritative students fail to check their own statements and so easily reach important decisions with inadequate understanding of the plants they discuss. Michaux's complete discussion of *Draba arabisans* was as follows:

> ARABISANS. D. caule folioso, simplici vel rarius ramoso: foliis radicalibus cuneato-lanceolatis; caulinis lanceolatis; omnibus acutis: siliculis stylo acuminatis.
>
> *Obs.* Affinis *D. incanae;* minus ramosa; racemo fructifero minus elongato: siliculis longioribus: foliis caulinis dissitis.
>
> *Hab.* in rupibus ripariis ad lacum *Champlain* et in Nova Anglia.

Nevertheless, in a paper on GREENLAND Drabas, Mrs. Ekman states, without a word of qualification, that "*D. arabisans* was collected by Michaux in the Hudson Bay area ('Hudson Strait')." A glance at Michaux's own statement is sufficient to show the complete inaccuracy of this assertion. Lake Champlain, about 125 miles (200 km.) long, separates the states of Vermont and New York, extending slightly into southernmost Quebec. It has an altitude of 96 feet (29.4 m.) and a flora of Alleghenian type, slightly verging on warm-Canadian. Its northernmost shore is MORE THAN 1100 MILES (1770 KM.) SOUTH OF THE NEAREST POINT OF HUDSON STRAIT. Michaux's routes are perfectly well known;[2] the nearest he ever got to

[1] Elis. Ekman, *Contribution to the Draba Flora of Greenland, VII: Draba arabisans Michx.*, Svensk Bot. Tidskr. xxviii. 79–81 (1934).

[2] See Journal of André Michaux. 1787–1796, with an Introduction and Notes by Charles Sprague Sargent. Proc. Am. Phil. Soc. xxvi. no. 129 (1889).

Hudson Strait (except possibly in crossing the ocean) was the northern bend of Rupert River, 700 miles (1125 km.) to the south.

Mrs. Ekman's misstatement of the source of the type of *Draba arabisans* and her mistranslation of the very simple diagnostic phrase, "siliculis stylo acuminatis" as "the pointed styles" ("MICHAUX' diagnosis is very incomplete, but one characteristic deserves to be remembered, viz. the pointed styles") seriously shake a faith which, I had hoped, could be placed in her precision; and her confidence, from study of a single fragmentary specimen, that *D. arabisans* is a hybrid of *D. aurea* and *D. glabella* (*D. daurica*) as seriously disturbs my high estimate of her scientific judgment.

Briefly summarized, the chief diagnostic characters and the geographic ranges of the three plants under discussion are as follows:

D. AUREA: Short-lived perennial (sometimes biennial?), with few basal rosettes; stems simple or rarely forking, very leafy, densely stellate-pubescent and pilose; rosette-leaves canescent-pilose; cauline leaves 7–25, oblong- or ovate-lanceolate, with broad sessile bases, pilose; racemes mostly 10–60-flowered, with the lower 4–12 flowers leafy-bracted, in maturity elongating to ½–⅘ the total height of the plant; sepals pilose; petals golden-yellow; siliques 0.7–2 cm. long, densely pilose, with style 0.5–1.8 mm. long; seeds 30–50, about 1 mm. long. Greenland; northern Labrador; southwestern Ungava (no specimens seen from Hudson Strait); Black Hills and Rocky Mts. See PLATE 296 and MAP 8.

D. GLABELLA, VAR. TYPICA (D. DAURICA): Suffruticose long-lived perennial, forming extensive mats of rosettes; stems simple or sparsely branched, remotely leafy, minutely stellate-pannose; rosette-leaves minutely stellate-pannose; cauline leaves 0–5, mostly rounded at base, stellate-pilose or glabrate; racemes strictly terminal, long-peduncled, mostly 5–15-flowered and rarely, if ever, elongating to 1/2 the height of the plant; sepals pilose to glabrous; petals white; siliques glabrous or hirtellous, conspicuously veiny or rugose, 6–13 mm. long, with thick style obsolete or up to 0.5 mm. long; seeds 18–36, 0.7–1 mm. long. Arctic and subarctic regions, south to Newfoundland, Quebec, Lake Champlain (a single known station), New York, and shores of Hudson Bay. See PLATES 307 and 308, and MAP 17.

D. ARABISANS. Suffruticose long-lived perennial, forming extensive mats of rosettes; stems mostly branching, remotely few-leaved, glabrous or sparingly stellate-pannose; rosette-leaves minutely stellate-pannose or glabrate; cauline leaves 3–12, cuneate or but slightly rounded at base, glabrous or stellate-pannose; racemes strictly terminal, long-peduncled, the primary ones 7–25-flowered, in fruit ⅕–⅓ the height of the plant; sepals glabrous or sparsely hirtellous; petals white; siliques glabrous, lustrous and scarcely veiny, 5–15 mm. long, with slender style 0.5–1 mm. long; seeds 12–36, 1.1–1.7 mm. long. St. Lawrence basin and adjacent northern New England, Newfoundland to the Great Lakes. See PLATES 314 and 315 and MAP 21.

Draba arabisans, familiar to every botanist who knows its type-region, ledges about Lake Champlain, and the dry slates, schists and

limestones of most of the St. Lawrence basin, has so few traits of the arctic and subarctic *D. aurea* that it is almost unbelievable that any one should have imagined that it has any relationship to that short-lived golden-flowered plant, with leafy-bracted, very elongate racemes, numerous pilose leaves, pilose, mostly simple stems and pilose many-seeded siliques. Is it not apparent, if *D. aurea* ever were, by the most improbable long-distance transfer of pollen, a parent of *D. arabisans*, that something of the habit, pubescence, leafiness and color of flower ought to crop out in the "hybrid"? If such a far-fetched explanation were defensible, should not *D. arabisans* show something of the broad-based cauline leaves of *D. aurea* and of *D. glabella;* should it not occasionally have more ovules and seeds (the maximum number in *D. arabisans* and in *D. glabella* or *D. daurica* being near the minimum in *D. aurea*), and if *D. aurea*, with seeds 1 mm. long, should fortuitously cross with *D. glabella* with even smaller seeds (0.7–1 mm. long), why should their "hybrid" have the seeds consistently larger than in either (1.1–1.7 mm. long)? Furthermore, how was the hypothetical cross accomplished? The northernmost station of *D. arabisans* in the East (there, in the neighborhood of *D. glabella*) is 425 miles (684 km.) from the nearest colony of *D. aurea;* its northwesternmost station even more remote (450 miles or 772 km.) from the nearest *D. aurea* and quite as far from the nearest *D. glabella.* It would have required a relay of more than 400 unswerving and consecrated bees to transfer the requisite single pollen grain; bees are often cited as models for humans, but they have not this degree of altruism!

As to Mrs. Ekman's second proposition, that the Rocky Mountain *Draba praealta* Greene is another hybrid of *D. aurea* and *D. glabella* (*D. daurica*), little need be said. *D. praealta* is a winter-annual or very short-lived perennial of the group with *D. nemorosa.* Its northernmost area is more than 1000 miles (1600 km.) from the nearest *D. glabella* and in no character (except in being a Draba) does it suggest either *D. aurea* or *D. glabella.* It would be quite as sensible to argue that *D. nemorosa* is a hybrid of *D. aurea* and *D. verna.* No one who did so would be taken seriously.

The above cases in *Draba* and *Salix* are very typical of much of the space-filling guess-work which is too often passing as science, vagaries which suggest that when the hybridophile becomes too obsessed he is in danger of becoming the victim of hybridomania. Of such assumptions in case of *Rubus*, Professor L. H. Bailey thus speaks:

DRABA RUPESTRIS: FIG. 1, small flowering plant, × 1, from type locality, Ben Lawers, Scotland; FIG. 2, fruiting plant, × 1, from Newfoundland; FIG. 3, flowering plant, × 1, from Labrador; FIG. 4, leaves, × 10, from fig. 2.

We do not elucidate the blackberry problem by the assumption of miscellaneous hybridity as if the species themselves were known and all the puzzles were mixed progeny: our work takes a new direction the moment we cease to invoke crossing as a way of escape from difficulties. The fact that certain forms are puzzling and of doubtful specific validity does not make them hybrids.

Hybrids there may be, but the first effort is to determine the species which are supposed to spawn into mongrels. Hybridity is to be accepted only on evidence; it can not be determined by the examination of usual herbarium specimens. If sexual mixtures in blackberries are as common and widespread as has been imagined, then the systematology of the group is hopeless, as if hybridity were the order of nature and species were minor phenomena. . . . . .

From his wide experience with Rubus under field conditions, Fernald long ago (Rhodora xxii, 185) exposed the danger of easily assuming hybridity. The determination of hybridism in Rubus is not so simple and easy as one might suppose: consult, for example, the posthumous resumé of the work of Bengt Lidforss in Zeitschrift für Induktive Abstammungs und Vererbungslehre, vol. 12, 1–13, Berlin 1914. Note, also, the studies of Crane and Darlington in Genetica, ix, 1927.

It is important that the systematic treatment of Rubus in North America be kept simple enough so that others than batologists (blackberry particularists, and they usually do not agree among themselves) may be able to use the information; other ways should be found to record the minor variations and to satisfy the insistent urge to nominalize; otherwise, nomenclature loses its utility.

Perhaps Rubus is one of those genera, as Bacigalupi has recently said of Cuphea (Gray Herb. Contr. xcv.) "whose many technicalities render it particularly fitting that it be left in the hands of a specialist."[1]

Along a similar line of reasoning, Professor Einar Du Rietz, discussing the attitude of "the Swedish school of salicologists," says:

> if I have not misunderstood FLODERUS' recent papers, many of his species never form pure populations of any extension, those species thus being known only as single individuals or very small populations accidentally found here and there in the highly polymorphic syngameons classed by FLODERUS as hybrids. In those cases it may well be asked whether we are not on a dangerous road that may easily lead to complete dissolution of any practically applicable species-concept in those populations.
>
> This method of treatment, of course, involves the theory that the species distinguished are the primary units and the main population classed as hybrids is younger than those. This, however, is not proved. It appears quite possible that the smaller and more uniform populations classed as species are secondary units differentiated from the highly polymorphic syngameon classed as a complex of hybrids, or even only extreme forms accidentally appearing, disappearing and reappearing within this syngameon. In such a highly polymorphic syngameon any form of sufficient vitality may simulate a primary species if isolated, and to some extent even if not isolated.[2]

[1] Bailey, Gentes Herb. ii. 272, 273 (1932).

[2] Du Rietz, Svensk Bot. Tidsk. xxiv. 381, 382 (1930).

In our *Draba* population of northeastern America hybridization doubtless sometimes occurs, but, just as in most of our groups of vascular plants, the hybrids are quite obvious to those who are familiar with the true species. They do not make up a significant element in the flora, and, being chiefly sterile, they are taxonomically insignificant. The constant and freely fertile plants of definite and highly characteristic ranges surely are not demonstrated hybrids of taxonomically unrelated and geographically remote parents. In groups like *Draba*, mostly dependent on insect-pollination, "absent-treatment" hybrids must be demonstrated before they can be accepted.

In getting at types, some of which have not been discussed by others, I have met with universal kindness and courtesy. The most generous sending by Prof. Milbraed from Berlin of the actual type of *Draba Henneana* Schlechtendal has been noted. Similarly, with his well known liberality Sir William Wright Smith, Director and Regius Professor, has sent me from the Royal Botanic Garden at Edinburgh the type of *D. crassifolia* Graham. Mr. Ramsbottom and Mr. Exell, as noted, have supplied a photograph of and very detailed notes on the type of *D. glabella* Pursh preserved at the British Museum. Dr. Becherer and Mr. Macbride have sent as a gift photographs of and critical notes on four types of species described in DeCandolle's *Systema*. To all these gentlemen I here express my keen appreciation of their courtesies and aid.

In the present study, in which the problems have chiefly concerned plants of eastern Canada, Newfoundland and Labrador, I have been able to supplement the 892 sheets from this area in the Gray Herbarium and the herbarium of the New England Botanical Club with the remarkable collection in the National Herbarium of Canada, a collection made doubly valuable on account of the beautiful material from the shores of Hudson Straits and Hudson Bay secured by the late Dr. Malte and put at my disposal by Dr. R. M. Anderson. I have, furthermore, had the great advantage of receiving as a loan through Brother Marie-Victorin the invaluable collections of specimens of the Province of Quebec belonging to himself and to the University of Montreal. I have also, through the kindness of Drs. Merrill and Gleason, been able to study the material of the New York Botanical Garden and to borrow for closer examination many critical specimens. To all the gentlemen who have thus put irreplaceable collections at my disposal I extend my sincere thanks.

In view of the difficulty of the group and the admittedly tentative classification of it, at certain points, it has seemed important to illustrate very fully the more technical species, especially those which have been misinterpreted. Much obscurity and misunderstanding would have been avoided in the past if proper illustrations had accompanied the original descriptions of all species of the genus. The photographs have been most carefully and generously made by my life-long friend and a co-editor of RHODORA, Professor J. FRANKLIN COLLINS, the expenses of the photography and the making of the blocks met in part through the Wyeth Fund of the Division of Biology of Harvard University, in part through the Milton Fund for Research of Harvard University. With his accustomed great generosity and encouragement of accurate illustration, another friend of many years, who has aided me in the collection of many of the cited specimens, Mr. BAYARD LONG, has assumed the entire cost of reproduction of the half-tone blocks.

SYNOPSIS OF DRABA IN TEMPERATE EASTERN NORTH AMERICA
(east of the Great Plains and Hudson Bay)

a. Petals rounded or emarginate at summit: flowering stems with 1 or more leaves above the basal rosette, or, if scapose, with perennial bases, mostly branching caudices and marcescent remnants of old leaves along the caudices below the rosettes....*b.*

b. Flowering stem a slender scape (very exceptionally with a basal leaf or bract), including the mature raceme 0.1–1 (rarely –2) dm. high, rising from a basal rosette: rosettes solitary to numerous, at the summits of short crowns or of elongate branches or branchlets of the caudex; leaves of the rosette 0.3–2 cm. long, 1–5 mm. wide: siliques 2.7–9 (very rarely –10) mm. long. (Very exceptional specimens under the next "*b*" might be sought here)....*c.*

c. Leaves and scapes bearing simple or elongate and forking (as well as sometimes sessile and stellate) trichomes, or leaves merely ciliate or even glabrous....*d.*

d. Leaves conspicuously villous-ciliate: rachis and pedicels copiously villous-hirsute: sepals ovate to rounded-oblong, 1.5–3 mm. broad, villous-hirsute, rarely glabrous: petals yellow, 3.5–5.5 mm. long, 2.5–4 mm. broad: anthers 0.5–0.7 mm. long: seeds 1.3–1.5 mm. long.....1. *D. alpina.*

d. Leaves stiffly short-ciliate or eciliate: rachis and pedicels glabrous, short-hirtellous or stellate-tomentulose: sepals oblong, 0.5–1.8 mm. broad, glabrous or sparsely short-pubescent: petals white or becoming white in age, 2–5 mm. long, 1–4.5 mm. broad: anthers 0.2–0.5 mm. long: seeds 0.7–1.5 mm. long ....*e.*

e. Midribs of leaves becoming firm and prominent beneath, persisting as crowded subulate remains

on the multicipital caudices: scapes and pedicels glabrous or essentially so.

Expanding leaves with more or less stellate or furcate pubescence on the surface near the tips: sepals broad-oblong, 1.2–1.8 mm. broad: petals 3.5–5 mm. long, 2–4.5 mm. broad: anthers 0.5 mm. long: siliques oblong to narrowly ovate, 5–10 mm. long, 2–3.5 mm. broad; valves only obscurely or scarcely reticulate; septum without conspicuous median fold: seeds 16–20, often apiculate, 1–1.5 mm. long. . . . . 2. *D. fladnizensis*, var. *heterotricha.*

Expanding leaves with glabrous surfaces: sepals narrowly oblong, 0.5–1 mm. broad: petals 2–3 mm. long, 1–2 mm. broad: anthers 0.2 mm. long: siliques oblong-lanceolate, 2.7–7 mm. long, 1–2 mm. broad; valves reticulate-veiny; septum with broad median fold: seeds 10–16, rarely apiculate, 0.7–1.1 mm. long. . . . . 3. *D. Allenii.*

e. Midribs soft and evanescent: old leaves soon wilting, if persistent remaining as marcescent shreds, not as subulate remnants.

Perennial with multicipital caudex and long-persistent shreds of old leaves: leaves hispid with simple and variously forking trichomes: scape, rachis and pedicels hirtellous with simple or forking trichomes. . . . . 4. *D. rupestris.*

Short-lived perennial (sometimes biennial or annual?), with simple or but slightly branching caudex: leaves glabrous, rarely sparsely ciliate: scape, rachis and pedicels glabrous or scape sparsely hirtellous only at base. . . . . 5. *D. crassifolia.*

c. Leaves and scapes canescent-pannose with minute stellate trichomes, simple elongate trichomes wanting or very sparse.

Leaves cuneate-obovate to broadly oblanceolate, obtuse: siliques glabrous: style 0.3–0.4 mm. long: seeds 14–28, 0.7–1 mm. long. . . . . 6. *D. nivalis.*

Leaves linear or linear-oblanceolate, acute: siliques stellate-hirtellous: style 0.8–1 mm. long: seeds 8–10, 1.2–1.8 mm. long. . . . . 7. *D. Peasei.*

b. Flowering stem with 1–many leaves above the basal rosette, 1 cm.–5 dm. high: basal leaves in the perennial species 0.5–9 cm. long, 0.1–1.8 cm. broad: siliques 0.25–2 cm. long. (Very exceptional specimens of nos. 1–7 might be sought here) . . . . *f.*

f. Perennial, or nos. 8–10 biennial, with often branching caudex, the branches commonly terminating in rosettes of leaves: the biennial often simple-crowned nos. 8–10 very leafy (leaves 7–95) and with racemes often leafy-bracted at base. . . . *g.*

g. Flowering stem simple or with erect or strongly ascending branches: leaves entire or toothed, rarely laciniate: style many times shorter than the silique, at most 1.8 mm. long: seeds 10–50, 0.7–1.4 (rarely 1.7) mm. long. . . . *h.*

h. Petals deep yellow (fading in drying): cauline leaves of principal flowering stem 7–25: ovaries and siliques densely pilose; siliques lanceolate to linear-oblong, 0.7–2 cm. long, usually twisted.

DRABA CRASSIFOLIA: FIG. 1, small flowering plants, × 1, from original collection of Drummond; FIG. 2, flowering and fruiting plants from Labrador; FIGS. 3 and 4, fruiting and flowering plants from Greenland, × 1; FIG. 5, leaf and base of scape, × 10, from fig. 2; FIG. 6, flower, × 10, from fig. 4.

Lower 4–12 flowers of the primary raceme commonly subtended by leafy bracts: pedicels erect, the lowest 5–15 mm. long in fruit.....8. *D. aurea.*
Lower flowers bractless, the lowermost only rarely subtended: pedicels spreading to arched-ascending, the lowest only 2–4 mm. long in fruit.....9. *D. minganensis*

h. Petals white: cauline leaves 1–95: ovaries and siliques glabrous or variously short-pubescent; siliques linear-lanceolate to ovate or short-oblong, 2.5–12 (rarely–15) mm. long, if strongly twisted and more than 12 mm. long, glabrous or minutely stellate-tomentulose....*i.*

i. Biennial (rarely slightly perennial by brief persistence of basal offshoots): lower leaves of the rosettes shriveling soon after anthesis, the rosette-leaves not strongly contrasting with the lower cauline: the subspherical rosette of the 1st year loosening and elongating to form the very leafy (up to 50, rarely to 95, leaves) flowering stem: axis of raceme and pedicels densely pilose-tomentulose to villous with simple or forking hairs or with both intermixed.....10. *D. incana.*

i. Perennial, with branches of the caudex usually invested below with fibrous shreds of old leaves: new basal rosettes usually well developed at flowering time; their leaves unlike the cauline foliage: axis of raceme and pedicels glabrous, sparsely hirtellous or stellate-pubescent....*j.*

j. Foliage with all or many of its trichomes simple or elongate and irregularly forking, with or without admixed sessile or subsessile regularly stellate hairs....*k.*

k. Leaves glabrous except for sparsely ciliate margins, membranaceous, becoming translucent and conspicuously veiny (by transmitted light) in drying: plant otherwise glabrous except for hirtellous sepals: pedicels 4–10 mm. long, the lower nearly equaling the oblong-lanceolate siliques.....11. *D. Sornborgeri.*

k. Leaves hirtellous to stellate-pubescent, firm, opaque: stems hirsute at least on the lower internodes: pedicels 0.5–7 (rarely–10) mm. long, mostly much shorter than the elliptic, oblong or lanceolate siliques....*l.*

l. Foliage with numerous simple or elongate and furcate trichomes: rosette-leaves linear-oblanceolate to narrowly spathulate or narrowly obovate, 1–6 mm. broad: mature fruiting stems 0.1–2.5 dm. high, with 1 (rarely 0)–13 (average 6) leaves: sepals 0.4–1.5 mm. broad: petals 3–4.2 mm. long: primary fruiting racemes 1/3–6/7 the full height of the plant: seeds 14–28.

Cauline leaves ovate, 3–10 mm. broad: sepals 1.8–2.6 mm. long, 1–1.5 mm. broad: petals 2–3 mm. broad: siliques oblong or oblong-lanceolate, 2–3.8 mm.

broad; the lowest on pedicels 1–5 mm. long.....12. *D. norvegica.*

Cauline leaves linear-lanceolate to narrowly ovate, 1.5–6 mm. broad: sepals 1.6–2 mm. long, 0.4–0.9 mm. broad: petals 1–1.5 mm. broad: siliques linear to linear-lanceolate, 2–2.5 mm. broad; the lowest on pedicels 4–10 mm. long.....13. *D. clivicola.*

l. Foliage with numerous stellate and several to few simple and elongate trichomes; rosette-leaves cuneate-oblanceolate, 4–9 mm. broad: mature fruiting stems 1–3.5 dm. high, with (3) 6–25 (average 10) leaves: sepals 1.3–2.3 mm. broad: petals 4.5–5 mm. long: primary fruiting racemes ¼–½ the full height of the plant: seeds 20–40.....14. *D. laurentiana.*

j. Foliage with close stellate pubescence forming, at least on the expanding leaves, a pannose coat, simple trichomes wanting or only rarely occurring (except as cilia) on the rosette-leaves....*m.*

m. Siliques plump, ovoid, ellipsoid or oblong, 2.5–10 mm. long, glabrous: sepals 1.5–2 mm. long, 1 mm. broad: seeds closely but irregularly imbricated, often turned oblique to the septum.....15. *D. pycnosperma.*

m. Siliques strongly flattened (plump only in no. 18, with densely tomentulose valves), ovate to lanceolate or linear, 5–15 mm. long, glabrous or pubescent: sepals 2–3.5 mm. long, 1–2.3 mm. broad: seeds not imbricated, lying flat against the septum ....*n.*

n. Siliques glabrous or only sparsely hirtellous or scabrous, strongly flattened: racemes usually bractless....*o.*

o. Cauline leaves mostly rounded at base, oblong, ovate or obovate: mature siliques usually definitely veiny, flattish, plane or only slightly twisted: style obsolete or thick and short (up to 0.5 mm. long): fruiting pedicels stoutish, short; the lowest 1–6 (rarely –8) mm. long.

Stems hirsute, especially on lower internodes, with abundant simple divergent trichomes over-topping the stellate hairs: cauline leaves (3) 6–25 (average 10).....14. *D. laurentiana.*

Stems closely stellate-pannose, sparsely or not at all hirsute on lowest internodes: cauline leaves 1 (rarely 0)–8, rarely–14 (average 4).....16. *D. glabella.*

o. Cauline leaves narrowed or only slightly rounded at base, oblanceolate, oblong or narrowly obovate: mature siliques scarcely or only obscurely veiny, often-

est twisted, sometimes flat, very thin: style slender, 0.5–1 mm. long: fruiting pedicels slender; the lowest 3–15 mm. long: stems glabrous or minutely stellate-pubescent.....17. *D. arabisans.*

n. Siliques densely stellate-tomentulose, only slightly compressed, hardly flat: racemes usually leafy-bracted at base.....18. *D. lanceolata.*

g. Flowering stem with strongly divergent branches: leaves laciniate or subpectinate: style filiform, 1.5–3 mm. long, ¼–⅓ as long as the spirally twisted stellate-pubescent silique: seeds 7–15, 1.2–1.8 mm. long.....19. *D. ramosissima.*

f. Annuals, winter-annuals or biennials, with bractless racemes: flowering stems leafy or with at least 1 pair of leaves above the basal rosette....*p.*

p. Siliques 1.7–6 mm. long, 6–16-seeded: petals (when developed) 2–3 mm. long: stems simple, or branching nearly to summit, with the numerous small leaves strigose with variously forking trichomes.

Stems with abbreviated corymbiform branches from the middle and upper axils: siliques linear-ellipsoid, 4–6 mm. long, minutely stellate-puberulent: seeds 1–1.5 mm. long.....20. *D. aprica.*

Stems mostly with elongate or leafy branches (or simple): siliques oblong-ellipsoid, 1.7–5 mm. long, glabrous: seeds 0.5–0.8 mm. long.....21. *D. brachycarpa.*

p. Siliques 5–18 mm. long, 15–80-seeded: petals (when well developed) 2–5 mm. long: stem simple or forking only below, hispid, at least below, like the leaves.

Flowers uniform, with yellowish (finally whitish) narrowly cuneate petals about 2 mm. long: leaves scattered nearly to the slender and elongate racemes: siliques 3–13 mm. long.....22. *D. nemorosa.*

Flowers heteromorphic, some with broad white petals 3.5–5 mm. long, others with reduced petals, others apetalous and cleistagomous: leaves mostly near the base: flowering stems and branches subscapiform: racemes comparatively short and thick: siliques 6–18 mm. long.

Leaves obviously dentate, hispid with stipitate and sessile forking trichomes: fruiting raceme elongate, its rachis and pedicels pubescent.23. *D. cuneifolia.*

Leaves entire or only obscurely dentate, hirsute-ciliate with simple trichomes, stellate-pubescent on the lower surface: fruiting raceme short and umbelliform, its rachis and pedicels glabrous..24. *D. reptans.*

a. Petals deeply cleft: annuals or winter-annuals: flowering stems naked scapes arising from basal rosettes.....25. *D. verna.*

(*To be continued*)

DRABA NIVALIS: FIG. 1, flowering plant, × 1, from Greenland; FIG. 2, fruiting plant, × 1, from Greenland; FIG. 3, leaves, × 10, from Newfoundland.

D. PEASEI, n. sp.: FIG. 4, fruiting plant (TYPE), × 1, from Gaspé Co., Quebec; FIG. 5, tips of leaves, × 10, from the TYPE; FIG. 6, valve, × 10, from the TYPE; FIG. 7, septum and seeds, × 10, from the TYPE.

DRABA AUREA: FIG. 1, small flowering plant, × 1, from Greenland; FIG. 2, small fruiting plant, × 1, from Greenland; FIG. 3, fruiting plant, × 1, from Alberta.

DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. Fernald

(*Continned from page 261*)

1. Draba alpina L. *Densely cespitose*, the caudex forming several crowded crowns *with masses of dead marcescent foliage* below the living rosette: *leaves* flat, elliptic-lanceolate, oblanceolate or narrowly oblong, obtuse to subacute, *entire or nearly so*, 0.7–2 cm. long, 2–5 mm. wide, *glabrous or more or less pubescent with simple or forking trichomes* on one or both surfaces, *conspicuously villous-ciliate with simple trichomes about* 1 *mm. long*, rarely with forking hairs intermixed: flowering stem a *naked scape*, rarely with a leafy bract subtending the lowest flower, 3–15 (rarely –20) cm. high, *hispid with simple and forking trichomes; raceme* at first corymbiform, *in fruit corymbose-racemose*, 4–20-flowered: *rachis and* slender *pedicels* (up to 1 cm. long) *copiously villous-hirsute; sepals oblong to oblong-ovate, rounded at summit*, 1.5–3 *mm. long, more or less villous: petals yellow*, obovate, shallowly emarginate, 3.5–5.5 *mm. long*, 2.5–4 *mm. broad: anthers* 0.5–0.7 *mm. long:* ovary glabrous or sparsely hispid; style 0.5–0.7 mm. long; siliques narrowly to broadly ovate, elliptic or oblong, 4–9 mm. long, 2–4 mm. broad, glabrous or sparsely hispid, with 12–20 *seeds* 1.3–1.5 *mm. long*.—Sp. Pl. ii. 642 (1753); O. E. Schulz in Engler, Pflanzenr. iv[105]. 84, fig. 8 (1927); Elis. Ekm. Svensk Bot. Tidskr. xxv. 479 (1931).—Arctic and subarctic regions, south on calcareous areas to Hudson Strait and the northern shores of Hudson Bay; northern Eurasia. Labrador: Ekortiarsuk, Cape Chidley, *C. Schmitt*, no. 289; crevices of rock, Cape Chidley, August 6, 1884, *R. Bell*. Ungava: Port Burwell, Hudson Strait, *J. M. Macoun*, no. 79,069, *Malte*, no. 119,988. Plate 290, figs. 1–4; map 1.

Var. nana Hook. *Leaves with* numerous *long* and simple or variously forking *trichomes on the surfaces*, 0.3–1 *cm. long:* scapes 0.5–7 cm. high.—Trans. Linn. Soc. xiv. 363 (1825). *D. Bellii* Holm in Fedde, Repert. iii. 338 (1907); Macoun, Geol. Surv. Can. t. 1 (date unknown); Payson, Am. Journ. Bot. iv. 261 (1917); Elis. Ekm. Svensk Bot. Tidskr. xxv. 469 (1931). *D. alpina*, var. *Bellii* (Holm) O. E. Schulz in Engler, Pflanzenr. iv[105]. 89 (1927).—

Map 1. Southern range in eastern America of Draba alpina.

Arctic regions, south to Hudson Strait. Ungava: Port Burwell, Hudson Strait, *J. M. Macoun*, no. 79,072 (mixed with *D. fladnizensis*, var. *heterotricha*); crevices of rocks, Mansfield Island, August 30, 1884, *R. Bell*. Plate 290, figs. 5–7.

I am not convinced by the treatments of either the late Dr. Payson or of Mrs. Ekman that *Draba Bellii* is a species distinct from *D. alpina*. It seems to me an extreme arctic development, with the regular reduction in size and the increase of trichomes which one would expect under most xerophytic conditions. The beautiful series of plants collected by Dr. W. Elmer Ekblaw on the Crocker Land Expedition of 1913–16 in northwestern Greenland contains quantities of material bearing out this interpretation. It is also significant that on the sheet of the isotype of *D. Bellii* in the Gray Herbarium the late Professor Ostenfeld, who certainly understood *Draba* in the Arctic better than most botanists, wrote "only *D. alpina*."

Numerous names have been proposed for the dwarf arctic extreme and Schulz recognizes in arctic and subarctic America the following, besides typical *D. alpina:* var. *nana* Hook., which he makes include var. *glacialis* Th. M. Fries (1869), not other authors; var. *Adamsii* (Ledeb.) O. E. Schulz, based upon *D. Adamsii* Ledeb. (1842), which Mrs. Ekman, l. c. 466, has identified, by comparison with the types, with the wholly different *D. micropetala* Hook. (1825); var. *Pohlei* O. E. Schulz, cited from Cape Chidley, and differing only in its narrow siliques (2–2.5 mm. wide); var. *Bellii* (above discussed); var. *corymbosa* (R. Br.) Durand (1856), based on *D. corymbosa* R. Br. (1819), which, as Mrs. Ekman has shown (l. c. 493), was based on the identical type of *Cochlearia fenestrata* R. Br. to which genus and species *D. corymbosa* actually belongs; and var. *pilosa* (Adams) Regel, based on *D. pilosa* Adams, the type of which, according to Mrs. Ekman (l. c. 484) is a wholly different plant from any form of *D. alpina*, with "linear, carinate leaves, which are keeled on the underside and ciliate in long, hispid, simple hairs. The upper part of the stalk is glabrous like the pedicels" etc.

For our dwarf extreme of *Draba alpina* the name var. *nana* Hook. seems safe, at least.

2. D. fladnizensis Wulfen, var. heterotricha (Lindblom) Ball. Loosely to densely *cespitose*, the many branches and branchlets of the *caudex* closely *invested below* the living rosettes *with* pale, marcescent *subulate midribs* of former leaves: *leaves* oblanceolate, thin, 0.5–

1.5 cm. long, 1.5–4 mm. wide, entire or sparingly toothed, *with firm and finally prominent midrib, ciliate* with simple or bifurcate trichomes, *the surfaces glabrous except for simple, forking and stellate pubescence toward the tips of the expanding leaves: flowering stems* very slender, *filiform, scapose,* very rarely with a small leaf, *glabrous* or sparsely hirtellous, 1–10 cm. high: raceme at first corymbiform, becoming short-racemose, with mature rachis 0.5–4 cm. long, 2–13-flowered: flowering pedicels up to 6 mm. long: *sepals oblong, rounded at summit,* 2–2.5 mm. long, 1.2–1.8 *mm. broad, sparsely hirsute or glabrous: petals white,* obovate, emarginate, 3.5–5 *mm. long,* 2–3.5 *mm. broad: anthers* 0.5 *mm. long:* ovary glabrous, with a very short style; *siliques oblong to narrowly ovate,* 5–10 *mm. long,* 2–3.5 *mm. broad,* glabrous, *only obscurely or scarcely reticulate; septum without median fold* or with slight basal fold: *seeds* 16–20, often apiculate, 1–1.5 *mm. long.*—Bull. Soc. Bot. Fr. vii. 230 (1860). *D. lactea* Adams, Mém. Soc. Nat.Mosc. v. 104 (1817); DC. Syst. ii. 347 (1821) and Prodr. i. 170 (1824); O. E. Schulz in Engler, Pflanzenr. iv[105]. 261, fig. 25, H–L (1927). *D. androsacea* Wahlenb. Fl. Lapp. 174, t. 11, fig. 5 (1812) and various Am. auth., not Willd. (1800). *D. Wahlenbergii* Hartm. Handb. Skand. Fl. 249 (1820) and many later authors. *D. lapponica* DC. Syst. ii. 344 (1821) and many later authors. *D. Wahlenbergii,* β. *heterotricha* Lindbl. Linnaea, xiii. 324 (1839). *D. fladnizensis* Wats. in Gray, Syn. Fl. N. A. i[1]. 109 (1895) and other Am. auth. in part, not Wulfen (1778). *D. fladnizensis* **lactea* (Adams) and **lapponica* (Willd.) Dahl in Blytt, Haandb. Norges Fl. ed. Dahl, 382 (1906).—Arctic regions, south to the Torngat region of Labrador, Hudson Bay and the Canadian Rocky Mts.; northern Eurasia. LABRADOR: on slaty talus slope, Rowsell Harbor, lat. 58° 58′, *Abbe & Odell,* no. 373; moist, mossy, northern face of Ridge (ca. 320 m.) extending south from East Bay, Ikordlearsuk, lat. 59° 55′, *Abbe & Odell,* no. 382; steep, wet, cold bank of "K" River, Kangalaksiorvik, lat. 59° 18′, *Abbe,* no. 375; spur on southwest side (1140 m.), Mount Tetragona, lat. 59° 18′, *Abbe,* no. 379; lower slopes, north side of Komaktorvik, lat. 59° 16′, *Abbe,* no. 376; top of ridge north of harbor, Razorback Harbor, lat. 59° 14′, *Abbe,* no. 384; scree slide from top of Precipice Ridge to Komaktorvik Lake, lat. 59° 12′, *Abbe,* nos. 380, 381; on granitic rock, North Shore of Duck Bight, north of Ryan's Bay, *Woodworth,* no. 239: Okkak, *Moravian Bros.;* Ramah, *A. Stecker,* no. 212x; East Summit of Bishop's Mitre, lat. 57° 56′, *Abbe,* no. 386; West Summit of Bishop's Mitre, *Abbe,* no. 387. UNGAVA: Port

Map 2. Southeastern Extension in America of DRABA FLADNIZENSIS, var. HETEROTRICHA.

Burwell, Hudson Strait, *J. M. Macoun*, no. 79,072 (mixed with *D. alpina*, var. *nana*), *Malte*, nos. 120,038, 120,062, 120,136, 120,136a. PLATE 291; MAP 2.

Although some recent European authors keep *Draba lactea* Adams (*D. Wahlenbergii* Hartm.) apart as a species from *D. fladnizensis*, it is significant that the characters relied upon are not of the first importance. Lange, Ostenfeld and numerous others have united them and in Hultén's Flora of Kamtchatka, where *Draba* was worked up by Mrs. Ekman, she says of *D. lactea:*

> These specimens from Kamtchatka have some simple hairs even on the surface of the leaves and seem like most Siberian material somewhat infected with *D. fladnizensis* WULF.
>
> *D. lactea* ADAMS has been identified by SCHULZ with *D. Wahlenbergii* HARTM. and *D. lapponica* DC. This identification is probably right, as the specimens in Herb. DE CANDOLLE given to DC. by STEVENS and FISCHER belong to these species, ...
>
> From the diagnosis of ADAMS (loc. cit.) [of *D. lactea*] one must also conclude that *D. fladnizensis* is meant. ADAMS thus describes the leaves as "superne fere glabra subtus et ad marginem pilis simplicibus hispida" and mentions nothing about the stellate hairs that are characteristic of *D. Wahlenbergii*. This contradiction between the diagnosis and the second-type plants can only be explained under the assumption that, when making the diagnosis, ADAMS has had in view such impure, somewhat intermediate specimens as these here mentioned from Kamtchatka.[1]

Since, as would appear from the above and numerous other published items, much of the Siberian (as well as Arctic) material is transitional from *D. fladnizensis* to *D. lactea* and since all the Kamtchatkan material is called *D. lactea* "somewhat infected by *D. fladnizensis*," although the latter is not known from Kamtchatka, I find myself beyond my depth in attempting to separate them as species. Further doubt of the specific distinctions of *D. fladnizensis* and *D. lactea* is encountered in Schulz's treatment of the Gaspé plant. The only relative of *D. fladnizensis* in southeastern Quebec is a common, densely matted species (PLATE 292) of the Shickshock Mountains, with strictly glabrous leaves, very narrow sepals and petals, lance-acuminate siliques mostly 4 or 5 mm. long and only 1–2 mm. wide, septum with a conspicuous and broad median flange, seeds only 10–16 in number: in other words a plant quite different from either *D. fladnizensis* or *D. lactea*. Nevertheless, upon one collection of this completely isolated and endemic Shickshock species Schulz extends *D. lactea* to Gaspé: "Lower Canada: Table-Topped Mts., Gaspé Co. (J. A. Allen 1881)." Upon another collection of the same plant he

[1] Elis. Ekm. in Hultén, Fl. Kamtch. ii. 163 (1928).

DRABA MINGANENSIS, n. sp.: FIGS. 1, 2 and 3, small flowering plants, × 1, from Archipel de Mingan, Quebec (isotypes of *D. luteola*, var. *minganensis*); FIG. 4, flower, × 10, from fig. 1; FIG. 5, small fruiting plant, × 1, from Bic, Quebec.

D. LUTEOLA: FIG. 6, fruiting plant, × 1, from Colorado; FIG. 7, silique, × 10, from fig. 6.

bases his single record of the strictly Eurasian *D. fladnizensis* for all North America: "Kanada: Quebec, Matane Co., Mt. Mattaouisse, Südseite des Fernald Passes, 915–1000 m ü. M. (M. L. Fernald, Ludlow Griscom, K. K. Mackenzie, A. S. Pease, L. B. Smith 1923, n. 25779, hb. Deless.)"—Schulz, p. 257. If the uniform and wholly isolated Gaspé plant is both *D. lactea* and *D. fladnizensis* (which it is not), it would seem that fuller demonstration is needed before *D. lactea* and *D. fladnizensis* are accepted as distinct species. The Malte collections from Hudson Strait have been identified by Mrs. Ekman as *D. lactea* and as *D. lactea* crossed with various other species (*D. nivalis*, *D. rupestris*, etc.). See comments on p. 250.

3. D. **Allenii**, sp. nov. (TAB. 292), planta valde humifusa stragula 0.3–2 dm. diametro formans; caudiculorum ramis ramulisque filiformibus albescentibus confertis, inferne nervis mediis foliorum emortuorum persistentibus subulatis albidis nitidulis squamatis, superne foliis rosulatis cespitem laxum 0.5–2 dm. diametro formantibus; foliis tenuibus oblanceolatis 0.5–1.5 cm. longis 1–3 mm. latis subacutis integris vel subintegris enascentibus margine pilis simplicibus 0.2–0.5 mm. longis erectis deinde deciduis raro ciliatis caeterum glabris nerviis mediis subtus prominentibus; caulibus filiformibus simplicibus scapiformibus vel raro imo folio unico praeditis glabris nitidis 1–8 cm. altis; racemis floriferis confertis fructiferis parum elongatis (rhachi 0.2–2.5 cm. longo) 2–8-floris; pedicellis imis fructiferis 1.5–5.5 mm. longis; sepalis anguste oblongis 1.2–2 mm. longis 0.5–1 mm. latis submembranaceis glabris; petalis lacteis obovatis emarginatis 2–3 mm. longis 1–2 mm. latis; antheris 0.2 mm. longis; ovariis glabris 10–16-ovulatis; siliculis glabris oblongo-lanceolatis acutis vel acuminatis 2.7–7 mm. longis 1–2 mm. latis stylo 0.2–0.6 mm. longo coronatis, valvis reticulato-nervosis, septi medio valde plicato; seminibus a funiculis 0.2–0.5 mm. longis pendulis ovoideis brunneis 0.7–1.1 mm. longis.—Alpine areas of the Schickshock Mountains, Gaspé and Matane Cos., QUEBEC: on rock, at about 915 m. (3000 ft.), Table-topped Mountain, August 10, 1881, *J. A. Allen* (distributed as *D. androsacea*); abrupt, western calcareous slopes, alt. 1000–1100 m., Table-topped Mt., August 5, 1906, *Fernald & Collins*, no. 226 (distributed as *D. corymbosa*); calcareous cliffs, facing north, alt. 900–

Map 3. Range of DRABA ALLENII.

1125 m., Table-topped Mt., August 7, 1906, *Fernald & Collins*, no. 581; mossy hornblende-schist at about 915 m. (3000 ft.) near eastern end of the basin, northeastern slope of "Mt. Logan" [later determined to be Mt. Mattaouisse], July 22, 1922, *Fernald & Pease*, nos. 25,097, 25,101, 25,102; cold chimneys and rock-shelves at about 915–1000 m. alt., south side of Fernald Pass, Mt. Mattaouisse, July 8, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,779 (TYPE in Gray Herb.); cold schistose walls at head (alt. about 1070 m.) of Big Chimney, Mt. Mattaouisse, July 14, 1923, *Fernald, Griscom, Pease & Smith*, no. 25,783; boggy openings in Fernald Pass, alt. about 885 m., between Mts. Mattaouisse and Fortin, August 20, 1923, *Fernald & Smith*, no. 27,780; moist turfy chimneys at about 850–1000 m. alt., southern slope of Mt. Fortin, July 12, 1923, *Fernald, Griscom & Mackenzie*, no. 25,781; gravelly and turfy slides and chimneys at about 850–1000 m. alt., in the steep schistose southern face of Mt. Fortin, August 21, 1923, *Fernald & Smith*, no. 25,784; cold, mossy chimneys (alt. about 800–1050 m.) at head of Pease Basin, between Mts. Logan and Pembroke, July 13, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,782. All distributed, unless otherwise noted, as *D. fladnizensis*. MAP 3.

Draba Allenii, like *Ranunculus Allenii* Robinson, commemorates the pioneer botanical explorations of the Shickshock Mts. by JOHN ALPHEUS ALLEN, 1863–1916. Although obviously related to *D. fladnizensis* Wulfen and *D. fladnizensis*, var. *heterotricha* (Lindbl.) Ball (*D. lactea* Adams; *D. Wahlenbergii* Hartm.), PLATE 291, it differs from them both in important characters. Schulz, as noted in the discussion of *D. fladnizensis*, var. *heterotricha*, cites the two specimens of *D. Allenii* which had come to his attention, one as the only basis in North America of *D. fladnizensis*, as var. *laxior* (Gaudin) O. E. Schulz, based on *D. sclerophylla* Gaud., β. *laxior* Gaudin; the other as the only eastern Canadian representative of *D. lactea*.

Whether *D. sclerophylla*, β. *laxior* Gaudin is properly referable to *D. fladnizensis* is a question for students of the alpine flora of Europe to determine; but from *D. Allenii* it is very definitely distinguished by the following points specially noted in Gaudin's original and very detailed description: "R o s u l a e sessiles, densissime caespitosae, aggregatae et quasi confluentes" (in *D. Allenii* the rosettes terminating loosely elongate caudices and themselves very lax); "F o l i a . . . dura, . . . lineari-ligulata, . . . obsolete uninervia, . . . pilis mere marginalibus, rigidis" (in *D. Allenii* leaves thin and membranaceous, oblanceolate, very prominently costate beneath, mostly eciliate, but rarely with a few flexuous cilia); "F l o r e s . . . per exsiccationem ochroleuci" (in *D. Allenii* with no

obvious yellow after 10–12 years); "S i l i c u l a e . . . pedunculum aequantes, . . . ovales, . . . s t i g m a t e sessili" (in *D. Allenii* siliques much shorter than pedicels, lance-acuminate, with definite style). In general one does not expect in Gaspé local plants of the Swiss Alps, unless they have been found to have a broad circumpolar dispersal; and Schulz's account of his *D. fladnizensis*, var. *laxior* contains a point not mentioned by Gaudin, which is inconsistent with *D. Allenii* being the European plant: "Pedicelli . . . , inferiores (1–2) saepe ex axilla folii prodeuntes" (never in *D. Allenii*).

Draba fladnizensis, as shown in the original plate and in other excellent illustrations as well as in specimens from the Tirol and from the Rhaetic Alps and other continental European mountains, is, as well described by Schulz, a densely cespitose plant, with closely crowded short crowns, the oblong leaves very conspicuously and permanently ciliate with long stiff divergent trichomes, the siliques ellipsoid or oblong, obtuse, with valves scarcely reticulate, the septum without a long fold, the seeds 12–20. *D. Allenii* in its humifuse habit, with elongate freely forking filiform caudices, its leaves, when rarely ciliate, with few short, soft and erect (not divergent) cilia, its lance-acuminate or acute siliques with distinctly veiny valves, strong longitudinal fold of the septum and fewer seeds, is abundantly distinct.

Whether or not *Draba lactea* (PLATE 291) is maintained as a species or is treated as a variety (var. *heterotricha*) of *D. fladnizensis*, it has little in common with *D. Allenii:* cespitose habit; coarsely ciliate and variously pubescent leaves; much larger flowers; oblong to narrowly ovate siliques averaging twice as large as in *D. Allenii* and with veinless valves, plane septum and more numerous and larger seeds.

Draba Allenii is presumably on Mt. Katahdin, Maine. On September 21, 1926, Dr. G. L. Stebbins, jr. found at 4000 feet in the Chimney of Mt. Katahdin two plants of a strange Draba. Dr. Stebbins's published memorandum follows:

> While looking at the plants of *Saxifraga Aizoon* L. in the chimney, I noticed among them two plants of a Draba which I did not recognize, and which did not correspond to any of the Drabas described in Gray's Manual. Although I searched the surrounding rocks, I failed to find more than two plants, so I dared to take only a stalk with the seed pods. When I showed this to Professor Fernald, he identified it as *Draba fladnizensis* Wulfen, an arctic-alpine species which had not been found before south of the Shickshock Mountains of Quebec, and is therefore new to New England. Although both the Draba and the Saxifrage are normally

lime-loving, they were growing here on granite rocks in an acid soil region, and seemed quite healthy. There may be a little rich pocket in that particular spot, and it would certainly be interesting to find the soil reaction there.[1]

Under date of January 6, 1934, Dr. Stebbins writes: "I have visited the spot where I found them three times since, and in each case as diligent search as I was able to make failed to reveal the two plants or any others. I have, of course, been very much on the lookout for it on other parts of the mountain, but it hasn't turned up yet. The only hope for a real stand of it is in a narrow ravine that branches off the chimney to the right at its base, and looks wicked for climbing, though I have no doubt that the same band of softer, presumably more calcareous rock traverses it that is found in the chimney itself, which harbors quite a little *Saxifraga Aizoon*, and where I found the two plants mentioned."[2]

The much denuded fruiting raceme (with the valves gone) which Dr. Stebbins brought back seems to be that of *Draba Allenii*. Without seeing the foliage, however, it would be unwise to identify it with positiveness.

4. D. RUPESTRIS R. Br. Densely to loosely *cespitose, the multicipal caudex* with the short branches *retaining marcescent leaves or their shreds* and terminating in rosettes: *leaves* membranaceous, *linear-oblanceolate to oblong*, acutish, 5–15 mm. long, 1–3.3 *mm. broad*, 2–4-toothed or entire, *hispid with simple or variously forking trichomes, the midrib delicate and evanescent: flowering stem capillary, naked* (or rarely with 1–3 small leaves), 1–11 (–"25," *Ekm.*) cm. high, *hirtellous* with simple and forking trichomes or rarely glabrous: raceme during anthesis corymbose, in fruit elongating and with rachis up to 6 cm. long, 3–20-flowered; *pedicels hirtellous* with simple or forking trichomes, in maturity 1–4 mm. long; *sepals* narrowly oblong, 1.5 *mm. long, hirtellous:* petals white, obovate, 2.5–4 mm. long: ovary glabrous or hirtellous with simple and forking trichomes, 12–30-ovuled; *siliques on suberect or strongly ascending short pedicels, oblong*, 3–8 *mm. long, hirtellous* with simple or forking trichomes or glabrous (var. LEIOCARPA O. E. Schulz), with very short style: seeds oval,

[1] G. L. Stebbins, jr., RHODORA, xxix. 15, 16 (1927).

[2] Dr. E. T. Wherry, reporting on soil from the base of the *Saxifraga Aizoon* from Mt. Katahdin, "found it to be exactly neutral. The lime producing this condition in the soil may have come from a local concentration of calcium minerals in the granite—which is well known to occur elsewhere in Maine, especially on Mt. Desert Island—or may have been set free by unusually thorough decomposition of the humus at this point. The thing most difficult to account for would seem to be the manner in which the seeds of these circumneutral soil species managed to 'find' this favorable spot in the middle of a vast area of soils too acid to permit the plants to thrive.—Wherry, RHODORA, xxix. 139, 140 (1927).

DRABA MINGANENSIS: FIG. 1, well developed fruiting plant, × 1, from Bic, Quebec; FIGS. 2 and 3, flowers and tip of silique, × 10, from Bic.

brown, 1–1.3 mm. long.—R. Br. in Hort. Kew. ed. 2. iv. 91 (1812); DC. Syst. ii. 344 (1821) and Prodr. i. 169 (1824); Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, lvii. no. 3: 53, t. 3, figs. *h* and *o* (1917); O. E. Schulz in Engler, Pflanzenr. iv[105]. 223 (1927). *D. hirta* Sm. Fl. Brit. ii. 677 (1800) and Engl. Bot. xix. t. 1338 (1804), not L. (1759). *D. hirta*, γ *rupestris* (R. Br.) Wahlenb. Fl. Suec. 399 (1824).—Northern Europe, Greenland, Labrador, Ungava and Newfoundland, very local. LABRADOR: Ramah, July 15–August 20, 1894, *A. Stecker* (distributed as *D. hirta*, var. *arctica*); Eastward side of East Summit of Bishop's Mitre, lat. 57° 56′, August 21, 1931, *Abbe*, no. 385; Okkak, *Weitz* (Brit. Mus.); Battle Harbor, August 3, 1913, *W. E. Ekblaw*. UNGAVA: crevices of rock, Cape Chudleigh, *R. Bell*, no. 2027. NEWFOUNDLAND: limestone barren, near sea-level, Pointe Riche, August 4, 1910, *Fernald, Wiegand & Kittredge*, no. 3455, siliques glabrous = var. LEIOCARPA O. E. Schulz, l. c. 224 (1927). PLATE 293; MAP 4.

Map 4. Eastern American Range of DRABA RUPESTRIS.

Draba rupestris is obviously very rare in eastern America. The plants cited are fair matches for material from the type station, Ben Lawers (FIG. 1). Most of the plants, common in western and northern Newfoundland and adjacent southern Labrador, which have been passing as *D. rupestris* are better referred to the coarser and usually more leafy *D. norvegica* Gunner. Should it prove on further observation, as seems not unlikely, that *D. rupestris* and *D. norvegica* are confluent, the earliest name, *D. norvegica* Gunner (1772), should be used for both. I am here maintaining *D. rupestris* out of deference to the opinion of European students, although I expect that further study in the field will demonstrate it to be only an extreme phase of *D. norvegica*.

5. D. CRASSIFOLIA Graham. *Short-lived perennial* (biennial or annual ?) with simple or slightly branching caudex forming solitary rosettes or mats up to 5 cm. broad, *glabrous throughout* or the leaves sometimes ciliate: *leaves somewhat fleshy, drying thin and subtranslucent*, oblanceolate, obtuse or subacute, entire or essentially so, 0.4–1.5 cm. long, 1.5–5 mm. broad, *glabrous* throughout *or frequently sparsely ciliate with simple* (rarely bifurcate) *trichomes* 0.5–1 *mm. long: scapes filiform*, including the raceme 1–10 cm. high, naked or rarely with 1 or 2 leaves, *glabrous: raceme* at first corymbiform, *elongating in fruit to* 1–7 *cm.*, 3 (rarely 1)–10-flowered, *the lower* 1–2 *flowers remote: pedicels* filiform, glabrous, *the lower in fruit becoming* 4–10

in 1829, and under date of "*10th June* 1829" Graham described his species: "Plant densely caespitose, perennial." That it is a perennial which begins flowering very promptly is, however, indecated by Graham's statement: "It flowers most freely, . . . produces abundance of seed, and has come up in many of the neighbouring pots in the Edinburgh Botanic Garden without any change of character." If by the latter statement Graham meant that the cultivated plant had, in slightly more than one year, seeded, scattered its seeds and produced a second crop which had matured far enough to justify his saying "without any change of character," then, in cultivation in a temperate climate, *D. crassifolia* may evidently become annual. Mrs. Ekman, who seems to have studied the Greenland and European plants very thoroughly, says, "*Planta* saepe caespitosa." On the other hand, specimens of Drummond's original material (FIG. 1), which had once belonged to Jacques Gay but which are now in the Gray Herbarium, bear Gay's comment: "Févr. 1851. La plante est évidemment annuelle! Hooker et Asa Gray la classent à tort parmi les espèces vivaces."

Rydberg, in his Flora of the Rocky Mountains, ed. 2: 350, 353, reduces *D. albertina* Greene, without qualification, to *D. crassifolia* and he defines the latter as having "leaves oblanceolate to spatulate, hirsute" as contrasted with the "leaves narrowly linear-oblanceolate, glabrous" of his own *D. Parryi* (PLATE 300, FIGS. 4 and 5), which he maintains as a species.

In view of the doubts raised as to the duration of *Draba crassifolia* and by the definition of it by Rydberg as having the leaves hirsute, it has seemed desirable to examine Graham's own specimen. This, most happily, has been possible through the kindness of my good friend, the Regius Keeper of the Royal Botanic Garden at Edinburgh, Sir William Wright Smith (to whom I here reexpress my sincere appreciation); and I now have before me the original specimen preserved by Graham: "*Draba crassifolia* Graham, Hort. Bot. Edin. 1829. Seeds from Arctic America."[1] This is, as Graham himself stated, identical with Drummond's material (PLATE 294, FIG. 1).

[1] Drummond collected the plant, as shown on the label of one of his specimens in the Gray Herbarium (sent by Hooker, with whose specimens Graham's cultivated plant is identical) on "Summits of the Rocky Mountains between lat. 52° and 57°." The assumption, very general in the reports on botanical explorations in British America in the 1st half of the 19th century, that all points slightly north of the international boundary were "arctic" has led to endless confusion, by the citation, by Hooker and others, of plants growing from 52°–57° as coming from "Arctic America."

It is the northernmost extreme of the species adequately and clearly described by Graham with "*Leaves* (5 lines long, 2 broad), much crowded, subcarnose, smooth, veinless [when fresh, although clearly veiny by transmitted light when dry], indistinctly keeled, subdenticulate, rather sparingly ciliated with simple spreading hairs."

Rydberg's description of his *Draba Parryi* (which I am treating as a Colorado variety of *D. crassifolia*) was

Annual, perfectly glabrous, except a few cilia on the petioles: stems several, usually less than 1 dm. high, scapiform or rarely with a stem leaf: basal leaves numerous, linear or narrowly linear-oblanceolate, 1.5–2.5 cm. long—; etc.

The Colorado material of var. *Parryi* (PLATE 300, FIGS. 4 and 5) has at most (so far as I have seen) about 24 seeds in a silique, the leaves are at most 2.5 mm. wide and the tallest stem seen is 1.6 dm. high. Schulz, however, in transferring *D. Parryi* to varietal rank, gives it a characterization so unlike that of Rydberg's species that it is apparent that he has confused something with it:

Planta altior et ramosior, fructifera usque ad 20 cm longa. Caules interdum 3–4-phylli. Folia longiora, usque 3 cm longa. . . . Ovarium 24–36-ovultum. Pedicelli inferiores saepe valde elongati, usque 2, 5 cm longi.

Schulz, furthermore, begins his citation of specimens with Labrador; and of the tall (up to 2.5 dm.), branching, large-leaved (leaves 3–8 mm. broad), leafy-stemmed plant from Ramah (*Sornborger*, no. 61), which may have as many as 48 ovules and which has petals twice as large as in *D. Parryi*, he specially comments: "August fruchtend, besonders luxuriös mit beblätterten Ästen." Schulz's description of var. *Parryi* was, apparently, derived chiefly from the wholly distinct plant of Labrador (our no. 11, PLATE 300, FIGS. 1–3).

I have not seen the other Labrador specimens cited by Schulz under var. *Parryi;* they may be like the Sornborger material. It should be noted, however, that "Cumberland Inlet," cited under Labrador, is presumably the well-known Cumberland Sound of Baffin Island.

6. D. NIVALIS Liljebl. Densely to loosely *cespitose*, forming mats 1–10 cm. across; the branches of the multicipital *caudex* clothed *with marcescent shreds* of dead leaves and ending in compact *subglobose rosettes* 3–15 mm. in diameter: *leaves cuneate-obovate to broadly oblanceolate, obtuse*, entire or essentially so, *subcoriaceous*, 3–11 *mm. long*, 1–4.5 *mm. broad*, with the firm subulate midrib prominent beneath, the surfaces *canescent-pannose with minute* sessile or subsessile *stellate*

DRABA INCANA (var. CONFUSA): FIG. 1, small fruiting plant, from Archipel de Kécarpoui, Quebec; FIG. 2, dwarf plant, from Percé, Quebec (isotype of var. *conica*); FIG. 3, flowering plant, from Cow Head, Newfoundland; FIG. 4, small fruiting plant, from Newfoundland; FIG. 5, slender plant, from same station as fig. 2; FIG. 6, leafy plant, from Baie à Jean, Quebec; all × 1.

trichomes: flowering stem naked and scapose, very rarely with a single small leaf, filiform, 1–10 cm. high, *stellate-tomentulose:* raceme subcapitate at flowering, in fruit elongate into an open or lax raceme with rachis up to 6 cm. long, 1–13-flowered: pedicels stellate-tomentulose, very short in flower, elongating in fruit to 1–8 mm., then spreading or subascending: *sepals* narrowly oblong or narrowly ovate, 1.5–2 mm. long, *stellate-pilose; petals white,* cuneate-obovate, 2.5–3 *mm. long,* 1.2–2 mm. broad: anthers about 0.3 mm. long: ovary minutely stellate, 14–28-ovuled; *siliques* strongly flattened, lanceolate to narrowly oblong, *narrowed to the short* (0.1–0.4 *mm.*) *style, glabrous,* 4–9 mm. long, 1–2 mm. broad; *seeds* 14–28, 0.7–1 *mm. long.*—Vet.-Akad. Handl. (1793) 208 (1793), Utkast til Sv. Fl. ed. 2: 269, fig. 35 (1798) and Nov. Act. Reg. Soc. Sci. Ups. vi. 47, t. II, fig. 2 (1799); Watson in Gray, Syn. Fl. N. Am. i[1]. 109 (1895); Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, ii. no. 7: 26, t. II, figs. 2, 7, 8, 10, 13 and 16 (1926); O. E. Schulz in Engler, Pflanzenr. iv.[105]. 209 (1927); Elis. Ekm. Svensk Bot. Tidskr. xxvii. 339 (1933). *D. muricella* Wahlenb. Fl. Lapp. 174 (1812); Hook. Fl. Bor.-Am. i. 52 (1830); Torr. & Gr. Fl. N. Am. i. 104 (1838). *D. Liljebladii* Wallm. in Liljebl. Sv. Fl. ed. 3: 350 (1816). *D. stellata, α. nivalis* (Liljebl.) Regel, Bull. Soc. Nat. Mosc. xxxiv[2]. 192 (1861); Macoun, Cat. Can. Pl. i. 50 (1883).—Arctic regions and mts. of Eurasia and North America, south to the Straits of Belle Isle, Newfoundland, the Gaspé Peninsula, Quebec and shores of Hudson Bay. LABRADOR: talus slope, west side of the lower lake, Valley of the Bryant Lakes, Kangalaksiorvik, lat. 59° 23′, *Abbe,* no. 383; spur on southwest side (alt. 1140 m.), Mount Tetragona, lat. 59° 18′, *Abbe,* nos. 377, 378; Kangalaksiorvik Bay, September, 1908, *Owen Bryant;* on granitic rock, Head of Main Arm of Ekortiarsuk Bay, *Woodworth,* no. 240; margin of solid polygon, upper ridge (ca. 840 m.), Cape Mugford Peninsula, lat. 57° 50′, *Abbe,* no. 372; Okkak, *Moravian Brothers;* steep rocky hillside, Percoliak Island, Nain Bay, lat. 57°, *Harlow Bishop,* no. 324; Anatolak, *Sewall,* no. 516; Nain, *Lundberg* (Brit. Mus.); moist crevice near top of hill, Rodney Mundy Island, Indian Harbor, lat. 54° 27′, *Abbe & Hogg,* no. 369; rocky places, Dead Islands, lat. 52° 48′, July, 1882, *J. A. Allen.* UNGAVA: Port Burwell, Hudson Strait, *Malte,* nos. 120,098, 120,159. NEWFOUNDLAND: rocky crests, Cape Dégrat, Quirpon Island, *Fernald & Long,* nos. 28,344, 28,345; dry slaty crests of hills, Little Quirpon, *Fernald & Long,* no. 28,343; open

Map 6. Southeastern extension in America of DRABA NIVALIS.

peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,346; crevices of trap cliffs, Anse aux Sauvages, *Fernald, Wiegand & Long*, no. 28,347; gravelly shelves, crests and talus of diorite, Ha-Ha Mountain, *Pease & Griscom*, no. 28,342. Quebec: calcareous sea-cliffs and rock-slides by the Gulf of St. Lawrence, slightly west of Marten River, Gaspé Co., *Fernald & Pease*, no. 25,100; roches humides des falaises, Ruisseau Sorel, Gaspé Co., *Victorin, Rolland & Jacques*, no. 33,675; on bare hornblende-schist near the summit, about 1100 m. (3600 ft.) alt., Mt. Fortin, *Fernald & Pease*, no. 25,099; moist turfy chimneys at about 850–1000 m. alt., in steep schistose southern face of Mt. Fortin, *Fernald, Griscom & Mackenzie*, no. 25,786, *Fernald & Smith*, no. 25,788; cold chimneys and rock-slides at about 915–1000 m. alt., south side of Fernald Pass, Mt. Mattaouisse, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,785; cliffs and chimneys at about 800–1050 m. alt., east of Big Cascade, Pease Basin, between Mts. Logan and Pembroke, *Dodge & Pease*, no. 25,787. Plate 295, figs. 1–3; map 6.

7. D. **Peasei**, sp. n. (tab. 295, figs. 4–7), planta laxe cespitosa stragula 6 cm. diametro formans; caudiculorum ramis filiformibus albescentibus nitidis inferne foliis emortuis vix fibrillosis squamatis, superne foliis rosulatis cespitem laxum 6–13 mm. diametro formantibus; foliis linearibus vel lineari-oblanceolatis acutis crassis 3–6.5 mm. longis 1–1.5 mm. latis integris valde costatis utrinque laxe stellato-pannosis stellis 0.3–0.4 diametro, foliis maturis glabratis subcoriaceis nitidis; caulibus filiformibus scapiformibus 2 cm. altis stellato-hirtellis; floribus ignotis; racemis fructiferis parum elongatis (rhachi 1–2 cm. longo); pedicellis fructiferis stellato-hirtellis imis 4–6 mm. longis; siliquis stellato-hirtellis 3–6 ellipticis acutis 3–5.5 mm. longis 2–2.5 mm. latis stylo 0.8–1 mm. longo coronatis, valvis reticulato-nervosis; seminibus 1.2–1.8 mm. longis 4–5 in utroque loculo a funiculis 0.3–0.6 mm. longis pendulis.—Quebec: talus slope near Cape Rosier, Gaspé Co., July 18, 1928, *A. S. Pease*, no. 20,194 (type in Gray Herb.). Map 7.

Map 7. Range of Draba Peasei.

Draba Peasei, with which it is a great pleasure to associate the name of its discoverer, Arthur Stanley Pease, distinguished classical scholar and keen amateur botanist, was at first identified by me as *D. oligosperma* Hook. of the Rocky Mountain region and under that name was reported by Pease, Rhodora, xxxi. 55 (1929). It is, however, quite distinct from *D. oligosperma* in several characters, although the few and very large seeds and the long style at once

suggest that species. But *D. oligosperma* has much narrower and rigid leaves with more pronounced keel, usually smoother scape, longer raceme, pedicels strongly thickened at summit, inequilateral siliques often subtended by marcescent sepals, the valves (when pubescent) bearing simple or bifurcate, rather than stellate trichomes. In its flattish leaves *D. Peasei* is nearer to *D. incerta* Payson, of the northern Rocky Mountains, but that likewise has the siliques with simpler pubescence (or glabrous), longer, and with a strongly marked inequilateral tendency and usually longer pedicels (lowest in maturity 5–15 mm. long). Fuller and younger material of *D. Peasei* is needed, especially in flower and younger fruit. Its cordilleran allies have yellow petals.

8. D. AUREA M. Vahl. *Short-lived* perennial, or perhaps sometimes biennial, the simple to several-crowned *caudex covered below with marcescent leaves and their hardened bases:* new *rosettes* 2–7 cm. broad; *their leaves* oblanceolate to narrowly spatulate-obovate, narrowed to petioles, entire or obscurely dentate, 1–3.5 cm. long, 2–7 mm. broad, *canescent-pilose* on both surfaces *with mixed simple, variously forking and stellate trichomes: flowering stems* simple to freely branching, 1–4 dm. high, *pilose-hirsute with mixed pubescence,* leafy: *cauline leaves* 7–25, lanceolate, oblanceolate or oblong, entire or with low dentation, *with pubescence similar* to that of rosette and stem; *raceme* at first crowded, *finally much elongated and occupying* ½–⅘ *the total height of the plant,* chiefly 10–60-flowered, *the lower* 4–12 *flowers* of the primary raceme usually *leafy-bracted: pedicels erect, the lowest becoming* 5–15 *mm. long* in fruit: sepals oblong or narrowly ovate, obtuse, pilose, 2–4 mm. long; *petals deep- to sulphur-yellow* when fresh, narrowly cuneate-obovate, rounded or but slightly emarginate at summit, 4–6 mm. long: anthers about 0.5 mm. long: ovary densely pubescent, with 30–50 ovules; *style elongate* (up to 1 mm. long): *siliques* lanceolate to linear-oblong, 0.7–2 *cm. long,* 1.5–3 mm. broad, *usually twisted, with style* 0.5–1.8 *mm. long; valves with dense mixed pilosity:* seeds 30–50, about 1 mm. long.—Vahl in Hornem. Fors. Dansk Oecon. Plantel. ed. 2: 599 (name), in Hornem. Fl. Dan. ix. fasc. xxv. 3, t. mcccclx (1818) and in Hornem. Fors. Dansk Oecon. Plantel. ed. 3,

Map 8. Range in eastern America of DRABA AUREA.

i. 696 (1821); DC. Syst. ii. 350 (1821) and Prodr. i. 170 (1824); Hook. Fl. Bor.-Am. ii. 55 (1830); Torr. & Gr. Fl. N. Am. i. 107 (1838); Watson in Gray, Syn. Fl. i[1]. 110 (1895) in large part; O. E. Schulz in Engler, Pflanzenr. iv[105]. 175 (1927) as to main form. *D. aureiformis* Rydb. Bull. Torr. Bot. Cl. xxviii. 278 (May, 1901). *D. Bakeri* Greene, Pl. Baker. iii. 6 (Nov. 18, 1901). *D. uber* Nelson, Bot. Gaz. xxxiv. 366 (1902). *D. aurea*, var. *aureiformis* (Rydb.) O. E. Schulz, l. c. 176 (1927). *D. aurea*, var. *aureiformis*, forma *uber* (Nelson) O. E. Schulz, l. c. 176 (1927).—Greenland, Labrador and Ungava; Alberta and British Columbia, south to South Dakota and Utah. LABRADOR: Ramah, *A. Stecker*, no. 216; Hebron, *Erdmann*, no. 63 (Brit. Mus.); Okkak, *Moravian Bros.;* Port Manvers, *E. B. Delabarre*, no. 93. UNGAVA: south of Fort George, James Bay, *A. P. Low*, Herb. Geol. Surv. Can. nos. 63,145, 63,146. PLATE 296; MAP 8.

The report of *Draba aurea* from Michigan (Walpole, Papers Mich. Acad. Sci. vi. 313. 1926) was based on a fruiting specimen of *D. arabisans*.

Although it is customary in the Rocky Mountain region to consider *Draba aureiformis* Rydb. a species apart from *D. aurea* of Greenland and Labrador it would seem that those who do so have seen inadequate material of true Greenland *D. aurea* for comparison. Rydberg, in publishing it said

This species is nearest related to *D. aurea*, but characterized by the small light yellow petals [in the description "sulphur yellow, 3–4 mm. long"], the slender style ["about 1 mm. long"], the less dense pubescence, and slender stem.

Schulz, in separating it, as var. *aureiformis*, gives the same general characters, which, had he seen fuller material from the Rocky Mountains, he would have found unreliable:

Var. AUREIFORMIS: Planta saepe gracilior. Flores minores. Sepala 2–2,5 mm longa [in typical *D. aurea* "3 mm longa"]. Petala dilutiora, sulphurea, 3–4 mm longa [in *D. aurea* "aurea, 5 mm longa"]. Siliculae . . . 7–15 mm longae, 2,5–3 mm latae, stylo breviore 0,5–1 mm longo coronatae [in *D. aurea* "1,2–1,6 cm longae, 2–3 mm latae, . . . apice stylo tenui 1–1,5 mm longo coronatae"].

As for the more "slender" cordilleran plant, it may be pointed out that most of the Greenland plants in the Gray Herbarium have the flowering stems (1–4 dm. high) only 1–1.5 mm. in diameter at base, although the stoutest of the 61 stems of the Greenland plant before me has a maximum diameter of 3.5 mm. *Macoun's* no. 10,276 from Waterton Lake, Alberta (FIG. 3), has the stems 2–2.5 mm. thick; these measurements are repeated by the cotype of *D. uber* Nelson (a low and compact form), by *Wolf & Rothrock's* no. 634 from Colorado,

by *Patterson's* no. 7 from Colorado, by *Goodding's* no. 1404 from Utah and by several other American specimens. Conversely, I fail to find a single cordilleran specimen "more slender" than the run of slender Greenland plants (FIGS. 1 and 2).

As for the smaller sepals (3 mm. long in the Greenland plant, 2–2.5 in the American), these measurements must have been optimistically made. 3 mm. is a good average for the Greenland specimens, but it is easy to find Greenland sepals 2.5 mm. long and not difficult to find them up to 3.5 mm. Although many American specimens have sepals only 2.5 mm. long, others show them longer: *Rydberg's* no. 516 from South Dakota, *Burke's* Rocky Mountain specimens, *Wolf & Rothrock's* no. 634 from Colorado and *J. R. Churchill's* collection of June 13, 1918 from Colorado all have them 3 mm. long; and such a beautifully prepared plant as *Patterson's* no. 7 from Gray's Peak shows many 3.2–3.3 mm. long, while *Payson & Payson's* young material, no. 5024, has them up to 3.4 mm. long. Similarly with the petals, it is not difficult to find plenty of petals of the cordilleran plant 4.5 mm. long (*Payson & Payson*, no. 5024, *Wolf & Rothrock*, no. 634, *Butters & Holway*, no. 40, etc., etc.), while a length of fully 5 mm. is easily measured in the Churchill and the Patterson specimens.

Although Schulz indicates that the siliques of the cordilleran plant are shorter (7–15 mm. long) than in the Greenland plant and that the styles are shorter, 0.5–1 mm. long, against 1–1.5 mm. in the Greenland plant, it is not without significance that the *Patterson* material so much cited and the *Macoun* plant from Waterton Lake (FIG. 3) should have siliques longer (17 mm. long) than Shulz allows for the Greenland plant; it is also important to note that the style in Greenland specimens (Upernavik, July 14, 1929, *Porsild*, our FIG. 2) may be well under 1 mm. in length, while in some cordilleran specimens (*Patterson*, no. 7, and *Butters & Holway*, no. 40) they are well over 1 mm. long.

With a residue of "sulphur yellow" against "aurea" as the specific or varietal difference between *D. aureiformis* and *D. aurea* it hardly seems worth while to attempt to keep them apart. As a Greenland and Labrador plant with a large cordilleran representation, *D. aurea* is consistent and is one of a large group of species with similar disruption of range. In the cordilleran region the group has greatly segregated and we get the fairly distinguished *D. luteola* Greene

(PLATE 297, FIGS. 6 and 7), *D. surculifera* Nelson (treated by Schulz as a form of *D. aurea*), *D. spectabilis* Greene, *D. neomexicana* Greene, *D. Helleriana* Greene and *D. pinetorum* Greene. On the limestone shores of the Gulf of St. Lawrence in eastern Quebec and on the calcareous islands of James Bay the group of *D. aurea* is represented by the following localized species.

9. D. **minganensis** (Victorin), comb. nov. *Biennial or perennial,* with simple to multicipital caudex: new *rosettes* 1–17 cm. across; *their leaves oblanceolate,* entire or sparingly dentate, 0.5–9 cm. long, 1.5–17 mm. broad, green to canescent, *the surfaces* more or less densely covered *with stalked and few-rayed irregularly stellate trichomes: flowering stems* 1–very many, simple to abundantly branched, 0.4–4 dm. high, *pilose-hirsute with simple, forking and stellate trichomes,* leafy: *cauline leaves* 7–25, oblong to narrowly ovate, *rounded to the sessile base,* entire or dentate, 0.5–4.2 cm. long, 0.2–2 cm. broad, *densely to sparsely stellate-tomentulose: racemes* corymbiform in anthesis, soon loosening and becoming in fruit 3–9 cm. long, 1.5–3.5 cm. in diameter, *standing well above the foliage* (very rarely with 1 basal

Map 9. Range of DRABA MINGANENSIS.

bract), mostly 10–30-flowered: *pedicels spreading to arched-ascending,* with pubescence as on the stem, *the lowest becoming* 2–4 *mm. long: sepals* 2.3–3.3 mm. long, oblong to oval, the herbaceous back *villous,* the broad margins hyaline: *petals yellow,* when fresh, 3.5–5.5 mm. long, narrowly cuneate-obovate, shallowly emarginate: anthers 0.3–0.4 mm. long: *ovary strongly villous-hirsute,* with 30–40 ovules and definite style: *siliques lanceolate to linear-oblong, usually twisted,* 1–1.8 *cm. long,* 2–4 mm. broad, *densely hirtellous with long divergent to retrorse unequally* 2–3-*pronged or* sometimes *simple trichomes mostly* 0.5–1 *mm. long; style* 1–1.5 *mm. long:* seeds brown, with conspicuous black hilum, 1 mm. long.—*D. luteola* Greene, var. *minganensis* Victorin, Trans. Roy. Soc. Can. sér. iii. xxii. (Sec. v.) 174, t. iv. (1928). Local, QUEBEC: Mingan Islands, July, 1882, *Linden;* sur le cailloutis nu et les lichens, sur la Pointe entre la Petite Île et "La Montagnaise," Archipel de Mingan, 29 juillet 1926, *Victorin & Rolland,* no. 24,828

(cotype in Gray Herb.); among boulders by the St. Lawrence, north base of Cap Enragé, Bic, July 8, 1905, *Williams, Collins & Fernald* (erroneously reported as *D. borealis* DC., in RHODORA, vii. 267 (1905); cold limy cliffs, north side of Cap Enragé, Bic, *Fernald & Collins*, no. 577 (erroneously reported as *D. aurea* Vahl, in RHODORA, ix. 161 (1907)); crevices of limestone-conglomerate, north side of Cap Enragé, Bic, *Fernald & Collins*, nos. 1064, 1065; sur le conglomérat nu, au nord du Cap Enragé, Bic, *Rousseau*, no. 26,582 (reported as *D. luteola* Greene, by Victorin, l. c.); talus, north slope, and beach under Cap Orignal. Bic, *Fernald & Collins*, nos. 578, 579; sur les schistes emittés, Pointe sud-ouest du Cap à l'Orignal, Bic, *Rousseau*, no. 31,007; sandy shore, Brushy Island, James Bay, *David Potter*, no. 546; sand along freshwater creek, 2–5 miles north of The Post, Charlton Island, James Bay, *Potter*, no. 247; sand and gravel, Little Charlton Island, *J. M. Macoun*, no. 1920 (see discussion on p. 250). PLATE 297, FIGS. 1–5 and PLATE 298; MAP 9.

Draba minganensis belongs to the yellow-flowered and leafy group of biennials and short-lived perennials which includes *D. aurea* M. Vahl and *D. luteola* Greene, with both of which it has been identified. From *D. aurea*, as clearly pointed out by Victorin, it differs in the strictly terminal racemes and the short pedicels. *D. aurea* (PLATE 296), furthermore, has the mature (fruiting) raceme very elongate, occupying ½–⅘ the entire height of the plant and, on account of the suberect pedicels, only 0.8–2.5 cm. in diameter. *D. minganensis*, with its shorter and thicker, strictly terminal racemes, with shorter and more spreading pedicels, is well separated from it, although its pubescence, especially of the siliques, is essentially the same.

Victorin left the plant of Bic (PLATES 298 and 297, FIG. 5) with the Rocky Mountain *Draba luteola* (PLATE 297, FIGS. 6 and 7) but separated from them the Mingan Island material (PLATE 297, FIGS. 1–4) as *D. luteola*, var. *minganensis:*

A typo differt: parvo habitu (4–9 mm. [cm.] long., raro 16 mm. [cm.]); caulinaribus foliis anguste ovo-lanceolatis (8–12 mm. long., 2 mm. lat.; raro 20 mm. long. et 5 mm. lat.), pubescentibus, ut caule stellaeformibus pilis densissimis longissimisque, praesertim inferius cum magnis dentibus spretis; foliis rosularibus generaliter integris.

I an unable, however, to separate on very fundamental lines the Mingan and Bic material. Most of the former (the type no.) is very small individuals (PLATE 297, FIGS. 1–3) from bare rocks and lichen-crust (one of the most sterile of habitats), conforming to Victorin's description in its low stature (4–9 cm.) and small leaves (8–12 mm. long, 2 mm. wide), but the Linden plant from the Mingans

(exact locality unknown) is better-grown and presumably from a more favorable habitat, 1.6 dm. high (very immature), with numerous branches. When fully grown it would have had considerable stature. At Bic *Draba minganensis* occurs either in the most sterile of dry gravels or in the most fertile of guano-enriched or cool and fog-moistened limy slopes and cliffs. In the driest gravel (*Fernald & Collins*, no. 578) the fully ripe fruiting plant (PLATE 297, FIG. 5) may be only 9 cm. high, with densely pubescent leaves only 5–10 mm. long. On rich and moist spots, however, it (PLATE 298) may be 4 dm. high, in the most luxuriant plants with as many as 20 freely branched flowering stems, with rosette-leaves up to 9 cm. long and 1.7 cm. broad and cauline leaves up to 4.2 cm. long and 2 cm. broad. These luxuriant plants, growing in cool and moist, highly enriched (with guano) habitats at Bic, certainly exceed in all points the starved type-material of *D. minganensis* and as a further response to their most favorable habitat their fleshy and brittle leaves have the pubescence more scattered than in the xerophytic type. The dwarf individuals (PLATE 297, FIG. 5) at Bic, however, growing in semi-arid conditions, have a stature as low, the leaves as small and the pubescence as dense as the type-collection (PLATE 297, FIGS. 1–3) from the Mingans. In many of the Bic specimens, furthermore, the cauline leaves show as appreciable toothing as in the Mingan plant, while some individuals of the latter series have nearly all the leaves entire. In the characteristic pubescence of the siliques, PLATE 298, FIGS. 2 and 3 (young in the Mingan material), and of the stems and pedicels I can find no difference. These characters seem to me more fundamental than the stature and the degree of toothing of the leaves.

Although the plant of Bic and the Mingan Islands has been placed with *D. luteola* Greene, of the Rocky Mountains, it differs from the cordilleran species in so many important characters that I cannot feel that the two are conspecific. *D. luteola*, as shown by a sheet of the type-collection and by others from the same region of Colorado (PLATE 297, FIGS. 6 and 7), has the pubescence of the entire plant very much finer than in *D. minganensis*, the stems and pedicels, as Greene correctly described them, "cinereously stellate-pubescent throughout, with only a scanty and dimly perceptible villous pubescence of simple hairs mixed with the stellate"; in *D. minganensis* the stems and pedicels are as pilose-hirsute as in *D. incana*. In *D. luteola*, as originally described, the racemes are "narrow and rather strict,"

DRABA SORNBORGERI, n. sp.: FIG. 1, portion of fruiting plant, × 1, from Ramah, Labrador (TYPE); FIG. 2, flower, × 10, from Ramah; FIG. 3, valve, × 10, from the TYPE. D. CRASSIFOLIA, var. PARRYI: FIGS. 4 and 5, flowering and fruiting plants, × 1, from Gray's Peak, Colorado.

the specimens showing them only 1.2–2 cm. in diameter (in *D. minganensis* 1.5–3.5 cm. thick); in *D. luteola* the slender and short-tomentulose lower pedicels are 4–8 mm. long (in *D. minganensis* thick, long-pubescent and only 2–4 mm. long). In *D. luteola* the siliques are pubescent with ascending to barely spreading and chiefly simple trichomes mostly less than 0.5 mm. long (in *D. minganensis* villous with divergent to retrorse mostly 2–3-pronged trichomes 0.5–1 mm. long). A habital character, furthermore, is apparently a singificant one. The primary racemes of *D. luteola* when mature make up, as in *D. aurea*, a large portion of the plant, occupying ⅓–⅔ its full height; in *D. minganensis* the thick spike is, in maturity, only ⅕–⅖ the full height of the stem.

The material from James Bay is both in anthesis and in fruit. It is all rather slender and with narrow leaves, but it has the pubescence of stems, leaves, pedicels and siliques which characterize *D. minganensis*. In the James Bay area alone does *D. minganensis* occur near *D. aurea*, which on the mainland near-by seems perfectly typical. For consideration of Mrs. Ekman's interpretation of *D. minganensis* as a hybrid see p. 250.

(To be continued)

DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. FERNALD

(*Continued from page 305*)

10. D. INCANA L. *Biennial* (rarely slightly perennial by the brief persistence of basal offshoots), with a simple or more or less multicipital ascending to decumbent caudex: *lower leaves* of the rosettes *shriveling soon after anthesis, the rosette-leaves not strongly contrasting with the lower cauline; the subspherical rosettes of the* 1*st year loosening and elongating to form the usually leafy* (up to 50, rarely to 95 leaves) *flowering stem: rosette-leaves* lanceolate or oblanceolate, 0.5–3 cm. long, 2–5 mm. broad, mostly *ciliate with long simple or bifurcate trichomes* and glabrous to hirtellous on the surfaces; *cauline leaves* few to very many, the lower narrow, the upper gradually broader and oblong to ovate, usually remotely dentate, *hirsute* with variously mixed simple, bifurcate and stellate trichomes: *flowering stem* 0.15–5 dm. high, simple to much branched, *usually densely leafy, pilose-hirsute to tomentulose or villous, especially above, and on the axis of the raceme with long* simple and variously forked *and implicated trichomes:* raceme at first dense, elongating in fruit, becoming 1–15 cm. long, few–100 (or more)-flowered; *the lower* 1–6 *flowers of the primary raceme usually leafy-bracted: pedicels densely pilose to villous,* the lowest becoming 1–5 mm. long: sepals oblong to elliptic, 1.5–2.5 mm. long, pilose on the back, white-margined: petals white, narrowly cuneate-obovate, emarginate or obtuse, 2.5–5 mm. long: anthers 0.3–0.5 mm. long: pistil glabrous, with 16–40 ovules and with a very short style: *siliques oblong or elliptical to lanceolate,* 4–14 mm. long, 1.5–3 mm. broad; *style obsolete or thick and up to* 0.3 *mm. long:* seeds 0.7–1 mm. long.—Sp. Pl. ii. 643 (1753); Torr. & Gray, Fl. N. Am. i. 107 (1838), in part; Hook. Fl. Bor.-Am. i. 54 (1830); Fern. & Knowlt. RHODORA, vii. 63, t. 60, figs. 1 and 2 (1905); Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, ii. no. 7: 36 (1926); O. E. Schulz in Engler, Pflanzenr. iv[105]. 282 (1927). *D. contorta* Ehrh. Beitr. vii. 155 (1792); DC. Syst. ii. 348 (1821) and Prodr. i. 170 (1824). *D. incana,* β. *contorta* (Ehrh.) Liljebl. Nov. Act. Reg. Soc. Sci. Ups. vi. 57 (1799).—Greenland; Labrador, Newfoundland and Saguenay and Gaspé Cos., Quebec; shores of James Bay; islands of Lake Superior, Michigan; boreal Eurasia. The following are characteristic. LABRADOR: Titterasuk, *C. S. Sewell,* no. 40; Nain, *Sewall,* no. 79; shore, Rigoulette, *Sornborger,* no. 70, *Bowdoin College Exped.* 1891, no. 269, *R. H. Wetmore,* no. 102,959; wet rocky hillsides, Indian Harbor, *Harlow Bishop,* no. 327. NEWFOUNDLAND: gravelly limestone shore, Cape Norman, *Wiegand, Griscom & Hotchkiss,* no. 28,348; calcareous rocks and talus, entrance to Port Saunders Harbor, *Fernald, Wiegand & Kittredge,* no. 3452; headlands of Cape St. George, *Mackenzie & Griscom,* no. 11,089[a]. QUEBEC: grassy gully, Île Kécarpoui, Archipel

de Kécarpoui, Saguenay Co., *St. John*, no. 90,477; Anticosti, June 23, 1861, *Hyatt, Shaler & Verrill;* sur le talus du rivage, Pointe de l'Est, Anticosti, *Victorin & Rolland*, no. 21,032; aux alentours au phare sur le cailloutis calcaire, Pointe de l'Est, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 21,479; sur les graviers calcaires, Baie du Renard, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 21,467; gravier du barachois, R. au Saumon, Anticosti, *Victorin et al.*, nos. 21,468, 21,473; sur les graviers du barachois, R. Dauphine, Anticosti, *Victorin & Rolland*, no. 27,310; graviers, Lac à la Croix, Anticosti, *Victorin & Rolland*, no. 27,311; bord de la lagune, Lac Salé, Anticosti, *Victorin & Rolland*, nos. 24,864, 27,192; Baie Ste.-Claire, Anticosti, *Victorin*, no.

MAP 10. American Range of DRABA INCANA.

4139; sur les cailloutis calcaire du sommet, Cap Gaspé, *Victorin, Rolland, Brunel & Rousseau*, no. 17,381; turfy crest of sea-cliffs, Cape Gaspé, *Pease*, no. 20,219; Anse-a-l'Indien, près du Cap Gaspé, *Victorin et al.*, no. 17,384; conglomerate (calcareous) sea-cliffs, Bonaventure Island, *Fernald & Collins*, no. 1082, *Victorin et al.*, no. 17,386; crests of calcareous sea-cliffs, Cap Blanc, Percé, August 17, 1904, *Collins, Fernald & Pease;* July 26, 1905, *Collins & Fernald*, no. 88; schistes, Chloridorme, *Rousseau*, nos. 31,214, 31,222; turfy roadside bank, Cap Chat, *Fernald & Pease*, no. 25,089. MAGDALEN ISLANDS: dry crevices or talus of East Cape, Coffin Island, *Fernald, Long & St. John*, no. 7505, in part (mixed with var. *confusa*). ONTARIO: Fort Severn, Hudson Bay, August 8, 1887, *J. M. Macoun*. MICHIGAN: Gull Islands, Lake Superior, *W. S. Cooper*, no. 112 (as *D. arabisans*, var. *orthocarpa*); rock crevices, Passage Island, near Isle Royale, *Povah, Brown & McFarlin*, no. 3671B (Univ. Mich.). MAP 10 (including vars.).

Var. CONFUSA (Ehrh.) Liljebl. *Siliques pubescent.*—Nov. Act. Soc.

Sci. Ups. vi. 57 (1799); Poir. Encycl. Suppl. ii. 524 (1811); Fern. & Knowlt. Rhodora, vii. 64 (1905): O. E. Schulz, l. c. 285 (1927). *D. confusa* Ehrh. Beitr. vii. 155 (1792); DC. Syst. ii. 348 (1821) and Prodr. i. 170 (1824), mostly. *D. incana* β. *hebecarpa* Lindbl. Linnaea, xiii. 331 (1839). *D. incana*, subsp. *confusa* (Ehrh.) Elis. Ekm. l. c. 36 (1926).—Greenland and Labrador to Newfoundland, Magdalen Islands, northeastern New Brunswick and James Bay, generally more common than the glabrous-fruited plant. Labrador: Okkak, *Moravian Bros.;* Nain, *C. S. Sewall*, no. 77, in part; Hopedale, *Sewall*, no. 169; edge of "The Park," Hopedale, *Abbe, Hogg & Forbes*, no. 370; on a roof, Fox Harbor, *J. A. Allen*, no. 76; West Point at mouth of Red Bay, September 6, 1923, *A. G. Huntsman*. Newfoundland: turfy limestone barrens, Burnt Cape, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 28,350; springy swales and turfy shores, Boat Harbor, *Fernald, Wiegand & Long*, no. 28,351; turfy slope near mouth of Big Brook, *Fernald & Long*, no. 28,349; turfy limestone barrens, Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Gilbert*, no. 28,352; turfy limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,715; peaty pockets in limestone ledges, Brig Bay, *Fernald, Long & Dunbar*, nos. 26,706–26,708; turfy shore, Bard Harbor, *Wiegand, Gilbert & Hotchkiss*, no. 28,353; turfy limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,354; turf overlying limestone, Grassy Island, St. John Bay, *Fernald, Long & Fogg*, no. 1729; dry gravelly limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 1730; turfy limestone shore, Sandy Cove, Ingornachoix Bay, *Fernald, Long & Dunbar*, no. 26,709; calcareous rocks and talus, entrance to Port Saunders Harbor, *Fernald, Wiegand & Kittredge*, no. 3454; turfy crests of calcareous cliffs and ledges, Cow Head, *Fernald & Wiegand*, no. 3453; abundant on roof of shanty, mouth of Barachois Brook (near Robinson Head, Bay St. George), *R. B. Kennedy*, nos. 1–3. Quebec: grassy shore, Îles Boisées de Cap Blanc, Washtawouka, Goynish, *St. John*, no. 90,481; grassy places, Archipel de Kécarpoui, *St. John*, nos. 90,478–90,480; turfy ledges, Île Triple, Archipel Washicouti, *St. John*, no. 90,482; sur un îlôt de gneiss laurentien, Îlets de la Baie à Jean, *Victorin & Rolland*, no. 18,249; sur le gneiss laurentien, Îlôts à Charles, Natashquan, *Victorin & Rolland*, no. 18,250; vielle prairie au bord de la mer, Pointe-aux-Esquimaux, *Victorin & Rolland*, no. 18,247; sur le cailloutis calcaires au bord de la mer, Île à la Vache Marine, Mingan, *Victorin & Rolland*, no. 18,248; sur le gravier calcaire, Île Ste.-Généviève, Mingan, *Victorin & Rolland*, nos. 21,465, 21,475; shore of Salt Lake, Anticosti, *J. Macoun*, no. 19; limestone detritus, crest of Cap Barré, Percé, August 16, 1904, *Collins, Fernald & Pease*, July 23, 1905, *Collins & Fernald*, no. 89, August 1, 1907, *Fernald & Collins*, no. 1080; calcareous sea-cliffs, Bonaventure Island, *Fernald & Collins*, no. 1081; clay soil, river-bank, Rupert House, James Bay, *David Potter*, no. 548. Mag-

DRABA NORVEGICA: FIG. 1, small fruiting plant, × 1, from Norway; FIG. 2, dwarf flowering plant, × 1, from Newfoundland; FIG. 3, small flowering plant, × 1, from Newfoundland; FIG. 4, fragment of flowering plant, × 1, from Newfoundland; FIG. 5, fragment of fruiting plant, × 1, from Newfoundland; FIG. 6, tips of rosette-leaves, × 10, from Newfoundland.

DALEN ISLANDS: dry sandy summit of Great Bird Rock, *St. John*, no. 1893; dry sandy headland, Brion Island, *St. John*, no. 1890; dry crevices or talus of East Cape, Coffin Island, *Fernald, Long & St. John*, no. 7505, in part; sur le sommet du Cap-de-l'Est, *Victorin & Rolland*, no. 9485; Entry Island, June 23, 1861, *Hyatt, Verrill & Shaler;* Pointe-aux-Vaches-Marines, Île de la Grand-Entrée, *Victorin & Rolland*, no. 9486; turfy crests of headlands and dry gravelly beach, Grindstone, *Fernald, Bartram, Long & St. John*, nos. 7503, 7504; sur les alluvions près de l'eglise, Île du Havre-aux-Maisons, *Victorin & Rolland*, no. 9584; Amherst, *Frits Johansen*, no. 93,671. NEW BRUNSWICK: grass plain, Grande Plaine, Miscou Island, *S. F. Blake*, no. 5590. PLATE 299.

Draba incana, in the regions where it abounds, is often weed-like, taking possession or recently exposed gravels, humus of rotting roofs, litter from the sea and the fisheries and other quite modern habitats. It is equally at home on the driest of gravels, ledges and sands and in the manure pile. *D. incana*, consequently, behaves in western Newfoundland and eastern Quebec just as it does in Greenland: "**Draba incana** L., the commonest species in the southern section [of western Greenland], is nitrophilous and often found on manured spots."[1] In such spots, of course, it is what O. E. Schulz calls "var." *luxurians* or "var." *robusta*. *D. incana*, therefore, as a quick-growing species, usually a biennial or winter-annual, varies extremely in size and habit. On the most xerophytic spots it may come to complete maturity with a stature of only 1.5–2 cm;[2] in rich humus, decaying litter or fertilized spots it may be 3–5 dm. high, either simple or freely branched, and with the almost innumerable leaves (the many leaves of the large 1st-year rosettes carried up by elongation of the axis) crowded or loosely imbricated. In single colonies individuals from a single sowing of seeds may be quite simple or may form loosely to densely cespitose mats with multicipital caudices, obviously dependent on food-supply and moisture; and single individuals of the latter habit may have either very densely leafy flowering stems (derived from vigorous primary rosettes) or almost leafless ones (derived from weaker secondary offshoots) springing from the identical base.

In some individuals in arid habitats the subspherical cabbage-like rosettes of the 1st year, deprived of moisture, scarcely lengthen to flower and fruit, producing low conical fruiting plants with closely crowded leaves and capitate racemes. Upon selected individuals

[1] Porsild, Meddel. om Grønl. xcii. No. 1: 30 (1932).
[2] Fernald, RHODORA, XXXV. 127, t. 239, fig. 5 (1933).

(FIG. 2) such as these (from Cap Barré, Percé) is based var. *conica* O. E. Schulz, l. c. 285 (1926); but other individuals (FIG. 5) from the same spot, especially those collected in a succeeding and wet, instead of dry, summer, with stems up to 3 dm. high, with leaves 1–2 cm. apart and with racemes elongate to 8 cm. or more (the tips still in anthesis), clearly demonstrate that var. *conica* is of absolutely no taxonomic value and would better have been suppressed.

Similarly, the other "varieties" and "subspecies," based merely on height, degree of branching, leafiness and other every-day responses to poverty or to richness of soil, seem too artificial for serious consideration; it would be as illogical to treat as varieties and subspecies the short or tall, simple or branched, small-leaved or large-leaved individuals of *Chenopodium album* or any other annual or biennial weed of neglected fields and disturbed soils. The minor edaphic responses of this nature proposed in *Draba incana* include the following (and several others, not accredited to North America), which make a most unnecessary and unwelcome load which must be carried along eternally in synonymy.

Var *nana* Lindbl. Linnaea, xiii. 332 (1839); O. E. Schulz, l. c. 284 (1927). "Planta pusilla. Caules 1, 5–10 cm longi, simplices vel ramosi, paucifolii, rarissime aphylli." [FIG. 4 and 2 stems of FIG. 1].

Var. *stricta* Hartm. Handb. Skand. Fl. ed. 2: 178 (1832); O. E. Schulz, l. c. 285 (1927). "Caulis strictus, simplex vel apice tantum ramosus, foliis numerosis (usque ad 50 vel etiam ad 95 . . .) valde approximatis imbricatis apicem versus sensim minoribus (igitur planta in adspectu conica!) obsessus. Flores paulo minores." [FIG. 6].

Var. *conica* "O. E. Schulz (n. var.)—*D. incana* Fernald et Knowlton! in Rhodora VII. 76. (1905) 63, t. 60, Fig. 1 et 2, non L.—Habitu varietatis *strictae*, sed humilior, 2–14 cm. alta. Racemus fructifer ± capitato-confertus. Siliculae minutae, 5–8 mm longae [in typical *D. incana* "6–12 mm longae"], pedicellis 3–1 mm longis [in typical *D. incana* "4–2 mm longis"] insidentes." [Selected starved individuals (FIG. 2) from Cap Barré, above discussed. Other individuals (FIG. 5) from the same lot of seed are "var. *stricta*." All of them, however, having copiously stellate-pilose siliques, are the earlier-published var. *confusa* (Ehrh.) Liljebl. (1799).]

Var. *luxurians* Aug. Berlin, Öfvers. Kgl. Vet.-Akad. Förhandl. Stockh. (1884), no. 7: 25 (1884); O. E. Schulz, l. c. 285 (1927). "Planta elata, 35 cm alta, viridula. Caulis densifolius, superne ramosus. Racemus terminalis basi bracteatus [typical *incana* "0,10–0,35 m alta . . . plerumque foliis multis (usque ad 55!) dense foliosi, . . . Racemus . . . floribus imis (1–6) saepe in axillis foliorum supremorum"]. Siliculae infimae pedicellis elongatis usque ad 4 cm. longis flexuosis insidentes (quasi corymbi racemorum lateralium ad siliculam unicam reducti!)" [Aberrant individuals such as are likely to occur in almost any species!]

Var. *robusta* "O. E. Schulz (n. var.)— . . . *Draba incana* Smith and Sowerby, Engl. Bot. VI. (1797) t. 388, non L. Planta robusta, usque ad 50 cm alta, viridula. Folia caulina numerosa, obovato-cuneata, acuta, utrinque dentibus acutissimis inaequalibus utrinque 2–5 inciso-dentata, inferiora 3,5 cm longa [typical *D. incana* with "Folia basalia . . . 1–2,5 cm longa; folia caulina . . . oblongo-ovata, acutiuscula, utrinque dentibus manifestis 1–3-dentata"].

An besonders fetten Stellen und in Kultur."

The statement of habitat shows that Schulz's last variety is merely luxuriant plants of cultivation or of unusually rich soil. Smith, whose plant of the English Botany is cited, had sufficient understanding not to call his plant different, simply because it was in the garden: "The root is biennial, flowering early in the second summer. The specimen here represented was sent from Scotland young, . . . and being planted in a garden, flowered more luxuriantly than is usual on rocks or walls; but the plant often grows in rich moist spots even on its native mountains. The specimen in Flora Danica is a starved one."[1]

The publication or the maintaining of such individual responses as true varieties in this day and generation (more pardonable a century ago), when a systematist, in order to qualify as competent, should be required to show at least elementary understanding of the simplest and most common edaphic responses of plants, is not worthy taxonomy; it is merely a mechanically artificial imitation of it. When one witnesses such matter put out as ostensibly serious and scholarly publication on page after page of elaborate books, he cannot help regretting that the obligation to maintain in our greater botanical libraries complete series of taxonomic works has made it necessary to pay for this single 396-page part of a volume $11.75 (gold), precious money which ought to have been available for a higher type of science. Such cases, as we say in America, "hit the pocket-nerve"; and they make one seriously doubt the economic wisdom of the priority-principle in nomenclature, the principle which, unfortunately, has established a paying market for any so-called taxonomic publications which, regardless of how padded they may actually be, can display an occasional "n. sp.," "n. var." or "n. comb." in their pages. The "new deal," the world over, calls for scrupulous inspection and editing before publication.

11. D. **Sornborgeri**, sp. nov. (TAB. 300, FIGS. 1–3), planta perennans denique pluricaulis fructifera 1.5–2.5 dm. alta; caudiculorum

[1] Smith, Engl. Bot. vi. t. 388 (1797).

ramis lucidis albescentibus foliis emortuis persistentibus tectis; caulibus simplicibus vel imo ramosis glaberrimis lucidis; foliis caulinis rhomboideo-lanceolatis vel oblongo-oblanceolatis membranaceis glaberrimis 1–2.3 cm. longis integris vel sparse dentatis pilis simplicibus vel furcatis remote ciliatis; racemis floriferis corymbiformibus fructiferis elongatis (rhachi 2–12 cm. longo) 2–24-floris; pedicellis 4–10 mm. longis glabris erecto-patentibus; sepalis oblongis obtusis sparse pilosis 2.5–3 mm. longis 1.2–1.7 mm. latis; petalis lacteis obovatis emarginatis valde unguiculatis 3.5–4 mm. longis 2–2.5 mm. latis; antheris 0.3 mm. longis; ovariis glabris 28–40-ovulatis; siliculis glabris oblongis subacutis 6–10 mm. longis 2–2.5 mm. latis stylo brevissimo (0.1–0.2 mm. longo) coronatis, valvis reticulato-nervosis; seminibus a funiculis 0.3–0.5 mm. longis pendulis ovoideis 0.8 mm. longis.—LABRADOR: slope of moist slaty detritus immediately below a field of snow, at about 500 m. alt., Ramah, August 20–24, 1897, *J. D. Sornberger*, nos. 61 (TYPE in Gray Herb.), 175 in part; originally distributed as *D. stenoloba* Ledeb. MAP 11.

MAP 11. Range of DRABA SORNBORGERI.

Draba Sornbergeri, erroneously reported as *D. stenoloba* by Fernald & Sornberger, Ott. Nat. xiii. 100 (1899), is unique among our leafy perennial species in its almost wholly glabrous character. From *D. stenoloba* it differs at once in its leafy and usually more branching stems, *D. stenoloba* having them simple and naked or with 1–3 remote leaves; by its glabrous character, the leaves and at least the bases of the stems in *D. stenoloba* being obviously hispid with simple and forking hairs; by the shorter racemes (the longest barely half the height of the plant) with shorter ascending pedicels and shorter and broader siliques, the northwestern *D. stenoloba* having the mature racemes one-half to two-thirds the entire height of the plant, the divergent to reflexed fruiting pedicels 7–15 mm. long and the linear siliques 1.2–2 cm. long.

Schulz treats *Draba Sornborgeri* as *D. crassifolia*, var. *Parryi* (Rydb.) O. E. Schulz, the latter based nomenclaturally on *D. Parryi* Rydb. Bull. Torr. Bot. Cl. xxix. 241 (1902); but in describing the variety Schulz was more influenced by the plant of Labrador than by true *D. Parryi* (PLATE 300, FIGS. 4 and 5) of Colorado and Wyom-

DRABA NORVEGICA, var. PLEIOPHYLLA, n. var.: FIG. 1, portion of fruiting plant, × 1; FIG. 2, flowering plant, × 1 (TYPE); FIG. 3, rosette-leaves and lowest internode, × 10; FIG. 4, silique, × 10; all from Newfoundland.

ing. *D. Parryi* or *D. crassifolia*, var. *Parryi*, briefly considered in this paper under *D. crassifolia*, is an extreme of *D. crassifolia* with linear-oblanceolate, acute rosette-leaves and nakes scapes, the fully mature plants rarely up to 1.6 dm. high and with racemes up to 25-flowered. Rydberg's original description of it was clear:

Annual, perfectly glabrous, except a few cilia on the petioles: stems several, usually less than 1 dm. high, scapiform or rarely with a stem leaf: basal leaves numerous, linear or narrowly linear-oblanceolate, 1.5–2.5 cm. long; pedicels spreading, in fruit 5–8 mm. long: flowers small; petals scarcely 2 mm. long, white or light yellow: pods erect, oblong, 5–8 mm. long, 1.5–2 mm. wide, glabrous: style obsolete.

Flowering and fruiting plants from the type-locality (Gray's Peak, Colorado) of *Draba crassifolia*, var. *Parryi* (*Patterson*, no. 6) are shown in PLATE 300, FIGS. 4 and 5. How different are they from the characterization of Schulz of var. *Parryi:*

Planta altior et ramosior, fructifera usqe ad 20 cm longa. Caules interdum 3–4-phylli. Etc.

a characterization based not on *D. Parryi* but on *D. Sornborgeri!*

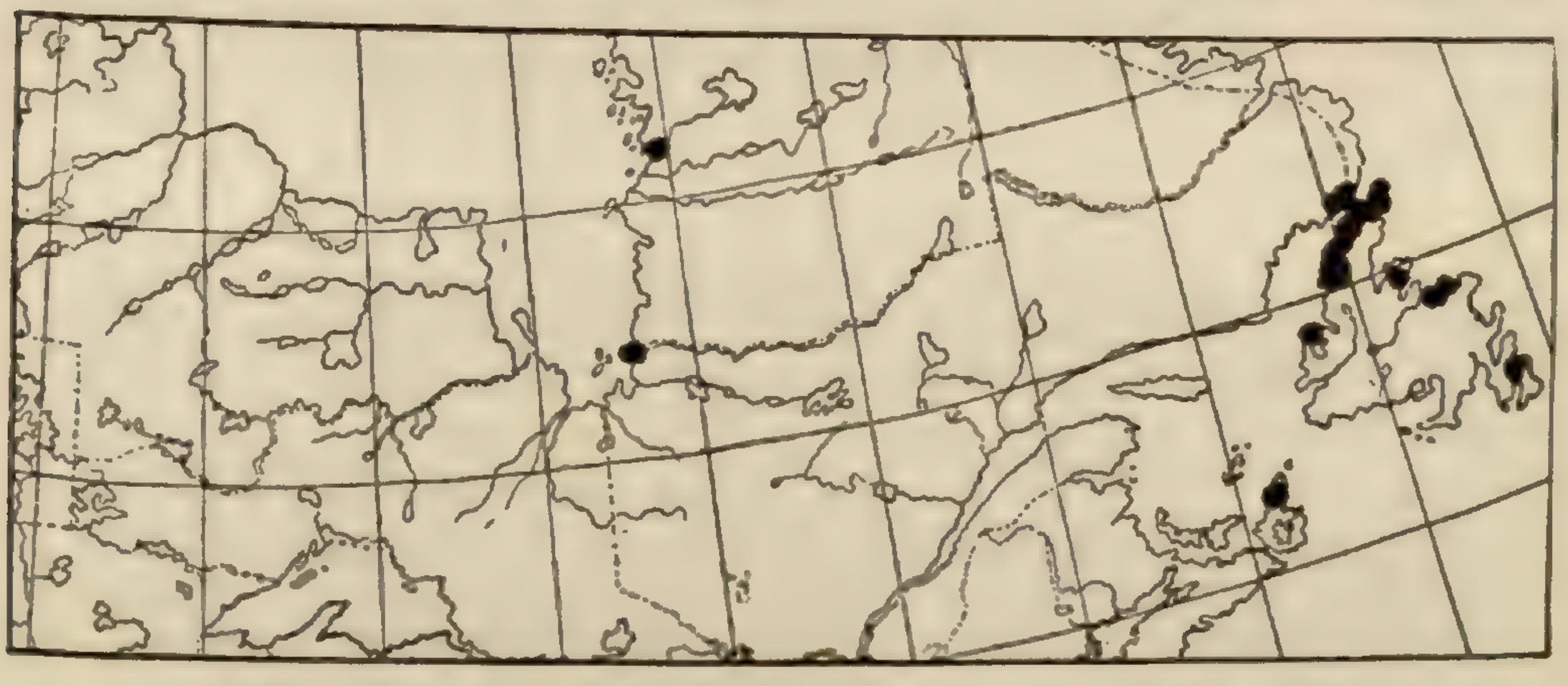
From *Draba crassifolia* (PLATE 294), which, of course, *D. Sornborgeri* suggests in its glabrous character, it is at once separated by its tall and usually branching and leafy stems; its broader leaves; its larger flowers, with sepals 2.5–3 mm. long (in *D. crassifolia* 1.5–2.3 mm. long); its petals 3.5–4 mm. long and 2–2.5 mm. wide (in *D. crassifolia* 2–3 mm. long, 0.7–1.2 mm. wide) and its more numerous (28–40) ovules and seeds (in *D. crassifolia* 16–20).

Although I have seen *Draba Sornborgeri* only from the slopes near Ramah, it is probably of more general occurrence in northern Labrador and is presumably on Baffin Island. This extention of range is suggested by Schulz's citation under *D. crassifolia*, var. *Parryi:* "L a b r a d o r: Cumberland Inlet (comm. W. H a n s [Cumberland Inlet or Cumberland Sound is in Baffin Island], Ramah (J. D. S o r n b o r g e r 1897, n. 61—20–24 August fruchtend, besonders luxuriös mit beblätterten Ästen, als *D. stenoloba*), Hebron (W e n c k 1851)."

12. D. NORVEGICA Gunner. *Cespitose* perennial, forming mats 0.3–1.5(–2) dm. broad, with slightly to freely branching caudex: *rosettes* few to very numerous, 1.5–3 cm. across; *their leaves* narrowly oblanceolate, oblong-lanceolate or narrowly obovate, 2–6 mm. broad, subacute or obtuse, entire or with 1–3 teeth on each margin, *hispid with numerous simple, bifurcate and stellate trichomes:* mature fruiting *stems* 0.1–2 dm. high, simple or forking, *hirsute especially below*, with

divergent simple and variously forked trichomes, with 1 (rarely 0)–5 *ovate hispid leaves* 3–10 *mm. broad*, with margins entire or 1–3-dentate: *racemes* in anthesis with the lower flowers often remote; *the primary ones in fruit* elongated to $^{1}/_{3}$–$^{6}/_{7}$ *the full height of the plant*, 5–25-flowered; *pedicels* short, often stellate-hirtellous, *the lowest in maturity* 1–5 *mm. long: sepals* oblong, obtuse, 1.8–2.6 *mm. long*, 1–1.5 *mm. broad: petals* white, 3–4.2 mm. long, 2–3 *mm. broad:* ovaries glabrous, with 14–28 ovules and very short style: *siliques oblong or oblong-lanceolate*, 5–9 mm. long, 2–3.8 *mm. broad*, acutish to obtuse, *with style* 0.2–0.5 *mm. long;* the *valves veiny* and glabrous or promptly glabrate: seeds 0.9–1.2 mm. long.—Fl. Norveg. ii. 106 (1772); O. E. Schulz in Engler, Pflanzenr. iv^{105}. 220 (1927). "An? *D.* pyrenaica" Oeder, Fl. Dan. i. fasc. iii. 6, t. cxliii. (1764), not L. (1753). *D. hirta*, var. *norvegica* (Gunner) Liljebl. Nov. Act. Reg. Soc. Sci. Ups. (1799) 56; DC. Syst. ii. 343 (1821) and Prodr. i. 169 (1824). *D. hirta*, β. *alpicola* Wahlenb. Fl. Lapp. 175, t. xi. fig. 1 (1812). *D. scandinavica* α. *legitima* Lindbl. Linnaea, xiii. 322 (1839). *D. laxa*, α. *legitima* Lindbl. l. c. 326 (1839). *D. rupestris*, β. *stricta* a. *lejocarpa* Lindbl. Bot. Notis. (1841) 221. *D. rupestris* Liebm. Fl. Dan. xiv. fasc. xli. 7, t. mmccccxxi. (1845) and many subsequent authors, not R. Br. (1812). *D. hirta*, δ. *incisa* Lange, Meddel. Grønl. iii^{1}. 43 (1880) and Fl. Dan. xvii. fasc. li. 9, t. mmmxxxiii. (1883). (For further citations see Schulz).—Northern Europe; Newfoundland, Cape Breton (Nova Scotia) southeastern Quebec and shores of Hudson Bay, Ungava and Quebec. Newfoundland: St. Anthony Harbor, September 10, 1923, *A. G. Huntsman;* near seaward edge of Fishing Head, St. Anthony, *Abbe & Brooks*, nos. 366, 368; exposed rocks, crests of Castle Rock, Tilt Cove, *Fernald, Wiegand & Darlington*, no. 5460; turfy and rocky crests, Twillingate, *Fernald, Wiegand & Bartram*, no. 5459; cliffs, Exploits, Notre Dame Bay, *Waghorne*, no. 27; Red Rocks, Brigus, July 31, 1931, *A. M. Ayre;* damp pocket, rocky crests, Cape Dégrat, Quirpon Island, *Fernald & Long*, no. 28,402; dry slaty crests of hills, Little Quirpon, *Fernald & Long*, no. 28,401; crevices of trap cliffs, Sacred Island, *Fernald & Long*, no. 28,404; dry trap cliffs south of Ship Cove, Sacred Bay, *Fernald, Wiegand & Long*, no. 28,406 (mixed with *D. glabella*); crevices of trap cliffs, Anse aux Sauvages, Pistolet Bay, *Fernald, Wiegand & Long*, no. 28,405; shelves, crests and talus of diorite cliffs, Ha-Ha Point, *Fernald & Long*, no. 28,396; shelves, crests and talus of diorite cliffs, Ha-Ha Mountain, *Fernald & Long*, no. 28,400 in part; trap ledges, Piton Point, Ha-Ha Bay, *Wiegand, Gilbert & Hotchkiss*, no. 28,395; limestone ledges and barrens, Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, nos. 28,382, 28,384, 28,386, 28,388; limestone ledges, Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 28,390; dry limestone rock-barrens, Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,391; turfy seashore east of Big Brook, Straits of Belle Isle, *Pease & Griscom*, no. 28,377; dry

limestone ledges, Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 26,703; dry gravelly limestone barren, Savage Point, *Fernald, Wiegand, Pease, Long, Gilbert & Hotchkiss*, no. 28,374; turfy and shingly limestone shore, Capstan Point, Flower Cove and peaty pockets in limestone ledges, Nameless Point, Flower Cove, *Fernald, Long & Dunbar*, nos. 26,710, 26,711; turfy limestone shores and headlands, Flower Cove, *Fernald, Griscom & Gilbert*, no. 28,372, *Pease, Long & Gilbert*, no. 28,373; turfy limestone barrens, Deadman Cove, Straits of Belle Isle, *Wiegand, Gilbert & Hotchkiss*, no. 28,376; limestone barrens near Ice Point, St. Barbe Bay, *Wiegand, Gilbert & Hotchkiss*, no. 28,375; peaty or turfy pockets in limestone barrens, Brig Bay, *Fernald, Long & Dunbar*, no. 26,704; crests of dry limestone, Dog Peninsula, St. Margaret Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,411; limestone cliffs and ledges on western



MAP 12. American Range of DRABA NORVEGICA.

face of Bard Harbor Hill, *Wiegand, Gilbert & Hotchkiss*, no. 28,389; exsiccated spots in quartzite barren near summit, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,392; wet escarpments on calcareous sandstone, western face, Bard Harbor Hill, *Fernald & Long*, nos. 28,409, 28,410; dry limestone cliffs and talus, western face, Doctor Hill, *Fernald & Long*, no. 28,408; dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,393; shaded shelves of limestone cliff, Crow's Head, St. John Bay, *Fernald, Long & Fogg*, no. 1743; turfy and gravelly upper border of limestone sea-beach, Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 1745; turfy borders of limestone beach, Gargamelle Cove, *Fernald, Long & Fogg*, no. 1741; shaly sea cliff, north side, Keppel Island, *Abbe & Pease*, no. 363; turfy crevices and talus of trap sea-cliffs, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 281. QUEBEC: calcareous cliffs, Blanc Sablon ("Labrador"), *Fernald, Wiegand & Long*, no. 28,413 (as *D. arabisans*); bare hillside about 3 miles north of Long Point, Brest, *E. C. Abbe*, no. 1262, as *D. megasperma*. UNGAVA: Richmond Gulf,

A. P. Low, no. 63,140; stony beach, 10 miles south of East Main, James Bay, *David Potter*, no. 549. NOVA SCOTIA: crevices of rocks, Big Intervale, Margaree, Cape Breton Island, *J. Macoun*, no. 18,987. All the preceding nos., unless otherwise noted, were distributed as *D. hirta* or as *D. rupestris*. PLATE 301; MAP 12.

Var. HEBECARPA (Lindbl.) O. E. Schulz. Flowering stems hispid to the summit: siliques permanently hispid with simple, bifurcate and sometimes stelliform trichomes.—O. E. Schulz in Engler, Pflanzenr. iv[105]. 222 (1927). *D. trichella* Fries, Novit. Fl. Suec. Mant. Alt. 40 (1839) and Summa Veg. Scand. i. 149 (1846) acc. to Schulz. *D. scandinavica*, β. *hebecarpa* Lindbl. Linnaea, xiii. 322 (1839). *D. rupestris* β. *stricta* b. *hebecarpa* Lindbl. Bot. Notiser (1841) 222 (1841). *D. rupestris*, * *trichella* (Fries) Nyman, Consp. i[1]. 53 (1878). *D. hirta*, * *trichella* (Fries) Hartm. Handb. Skand. Fl. ed. 11: 206 (1879). *D. hirta*, β. *hebecarpa* (Lindbl.) Strömfelt, Öfvers. Kgl. Vet.-Akad. Forhandl. 1884, no. 8: 110 (1885).—Northern Europe; Greenland; northwestern Newfoundland. NEWFOUNDLAND: turfy limestone barrens, Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, nos. 28,385, 28,387; upper border of limestone gravel-beach and shaded limestone escarpments, Burnt Cape, *Fernald & Long*, nos. 28,397, 28,398; turfy limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,712, in part (mixed with glabrous-fruited plant); gravelly talus of limestone sea-cliffs and dry gravelly limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, nos. 1742, 1744; all distributed as *D. hirta* L. (see discussion under *D. glabella*) or as *D. rupestris* R. Br.

Var. **pleiophylla**, var. nov. (TAB. 302), caulibus fructiferis 0.5–2.7 dm. altis; foliis caulinis 6–18; siliquis glabris.—Northwestern Newfoundland and adjacent Quebec Labrador. NEWFOUNDLAND: shelves, crests and talus of diorite cliffs, Ha-Ha Mountain, *Fernald & Long*, nos. 28,399, 28,400 (in part; mixed with typical *D. norvegica*); turfy limestone barrens, Burnt Cape, July 17, 1925, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, nos. 28,380 (TYPE in Gray Herb., some specimens misnumbered 20,380), 28,383; turfy limestone slopes near the sea, east of Big Brook, Straits of Belle Isle, *Fernald & Long*, no. 28,407; limestone escarpments on the Highlands northeast of Big Brook, *Pease & Griscom*, no. 28,378; peaty and turfy pockets in limestone barrens, Brig Bay, *Fernald, Long & Dunbar*, no. 26,705; dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,394; dry limestone cliffs and talus, western face of Doctor Hill, *Fernald &*

MAP 13. Range of DRABA NORVEGICA, VAR. PLEIOPHYLLA.

DRABA CLIVICOLA, n. sp.: FIGS. 1 and 2, flowering and fruiting plants, × 1 (TYPE); FIG. 3, portion of internode, × 10; FIG. 4, tip of rosette-leaf, × 10; 5, flowers, × 10; FIG. 6, valve of ripe silique, × 10; all from Shickshock Mts., Quebec.

DRABA LAURENTIANA, n. sp.: FIG. 1, small flowering plant, × 1, from Newfoundland; FIG. 2, portion of tall flowering plant (divided), × 1, from Archipel de Mingan, Quebec; FIG. 3, portion of internode, × 10. from Newfoundland (TYPE); FIG. 4, valve of ripe silique, × 10, from the TYPE.

Long, no. 28,408[a]; gravelly limestone barrens near the sea, Eddy's (or Old Man's) Cove, St. John Bay, *Fernald, Long & Fogg*, no. 1748; turfy and gravelly shore, Back (or Bustard) Cove, *Fernald, Long & Fogg*, no. 1747; limestone ledges in dry clearing, Port au Choix, *Fernald, Long & Fogg*, no. 1746; turfy talus of limestone sea-cliffs at base of Pointe Riche, *Fernald, Long & Fogg*, no. 1750. QUEBEC ("LABRADOR"): limestone and calcareous sandstone terraces and crests, Blanc Sablon, *Fernald & Wiegand*, nos. 3460, 3461 (as *D. arabisans*, var. *orthocarpa*), 3462, 3463, *Fernald, Wiegand & Long*, no. 28,412 (transitional). All (unless otherwise noted) distributed as *D. hirta* L. (see discussion under *D. glabella*) or as *D. rupestris* R. Br. MAP 13.

Although European (PLATE 301, FIG. 1) and Greenland material of *Draba norvegica* has few (and sometimes no) cauline leaves, the plant of Newfoundland and adjacent Quebec varies from individuals (PLATE 301, FIGS. 2–5) inseparable from authentic European specimens and from the beautiful plate in Flora Danica (t. mmmxxxiii.) to a more leafy extreme (PLATE 302), such as seems to be unknown in Europe, var. *pleiophylla*. In this leafy extreme *D. norvegica* approaches a number of species of the Gulf of St. Lawrence area. The plant of the Shichshock Mountains (PLATE 303), however, is separable by its narrower cauline leaves, smaller flowers, narrow siliques and longer pedicels. The stout *D. laurentiana* (PLATES 304, 305), occurring in much the same area as *D. norvegica* and its var. *pleiophylla*, is coarser throughout, with the foliage essentially lacking the simple trichomes which characterize the leaves of *D. norvegica*, usually more numerous leaves, larger flowers in relatively shorter racemes and more numerous seeds. In some of its forms *D. norvegica* approaches *D. glabella*, one of the commonest and most variable species about the Gulf of St. Lawrence; but *D. glabella* (PLATE 307) mostly lacks the simple pubescence on leaves and stems, being stellate-pannose.

As already noted, the distinctions between the larger plants (PLATE 293) of *Draba rupestris* R. Br. (1812) and the smaller plants of *D. norvegica* Gunner (1772) with 1 cauline leaf (or with this lacking) are not wholly satisfactory. *D. rupestris* is more delicate or slender; but I anticipate the merging of the two when the latter extreme has been more collected and studied on our northern barrens and shores. We should then have a species characterized by very narrow and hispid rosette-leaves, hispid stems, and hispid, ovate cauline leaves varying from 0 to 18, awkward for key-making, to be sure, but rather typical of the vagaries of *Draba*. If, furthermore, we were to abandon the characters of pubescence now relied upon, *D. norvegica*, as the oldest

name, would be applicable likewise to a large series of stellate-pannose plants of the boreal regions now maintained as distinct species.

Schulz, who recognized no true *Draba norvegica* nor its pubescent-fruited var. *hebecarpa* from North America, cited a single collection (PLATE 303, FIG. 1) from the Shickshock Mts. of Gaspé (*Dodge, Griscom & Pease*, no. 25,773) as belonging to his *D. norvegica*, var. *laxa* (Lindbl.) O. E. Schulz, of the Dovre Alps of Norway. Lindblom's *D. laxa* α. *legitima*, upon which Schulz's variety was based, was, apparently, not essentially different from *D. norvegica* Gunn. and described "scapis 1–2-phyllis." Lindblom explicitly cited *D. norvegica* "(descr. vitiosa)" and also cited the identical plate upon which Gunner had based *D. norvegica:* "*Fig.* Dr. an pyrenaica *Fl. Dan. t.* 143 (mala)." This illustration, although properly characterized by Lindblom as "mala," shows no cauline leaves and the Flora Danica plate of it cited by Schulz for *D. norvegica*, var. *laxa* has 0–4 cauline leaves. The sheet of the Gaspé plant (no. 25,773) preserved in the Gray Herbarium has more numerous (8–13) and narrower cauline leaves, much smaller flowers and more slender siliques on longer pedicels than in *D. norvegica* and, consequently, than in *D. laxa*, which was based in part on *D. norvegica*. It seems to represent an endemic species, which I am calling *D. clivicola*.

13. D. **clivicola**, sp. nov. (TAB. 303), planta humifusa stragula 3–15 cm. diametro formans; caudiculorum ramis ramulisque pallidis inferne foliis emortuis plus minusve fibrillosis squamatis, superne foliis rosulatis cespitem laxum 1.3–3 cm. diametro formantibus; foliis rosulatis lineari-oblanceolatis acutis 0.4–1.5 cm. longis 1–5 mm. latis integris vel marginibus utrinque 1–3-incisis plus minusve hirtellis pilis simplicibus furcatis stellatisque; caulibus floriferis filiformibus flexuosis simplicibus vel ramosis, fructiferis 0.3–3 dm. altis basi hirtellis; foliis caulinis 3–13 (av. 7), lanceolatis vel anguste ovatis 0.5–1.7 cm. longis 1.5–6 mm. latis hispidulis inciso-serratis vel integris; racemis floriferis confertis fructiferis elongatis laxis 2–13 cm. longis 5–19-floris; pedicellis imis fructiferis 4–10 mm. longis, saepe bracteatis; sepalis oblongis 1.6–2 mm. longis 0.4–0.9 mm. latis glabris vel sparse hirtellis; petalis lacteis anguste obovatis 2.8–4 mm. longis 1–1.5 mm. latis; antheris 0.3 mm. longis; ovariis glabris 16–26-ovulatis; siliculis glabris linearibus vel lineari-lanceolatis stigmato capitato coronatis 7–12 mm. longis 2–2.5 mm. latis, valvis obsolete reticulato-venosis; seminibus a funiculis 0.2 mm. longis pendulis ellipticis 1–1.3 mm. longis.—Shickshock Mts., Matane Co., QUEBEC: wet hornblende-schist at base of Big Chimney, altitude 400–600 m., Mt. Mattaouisse, July 22, 1922, *Fernald & Pease*, no. 25,096 (distributed as from "Mt. Logan"); schistose talus and wet shelves at base

of Big Chimney, July 10, 1923, *Dodge, Griscom & Pease*, no. 25,773 (TYPE in Gray Herb.); cold schistose walls at head (alt. 1070 m.) of Big Chimney, July 14, 1923, *Fernald, Griscom, Pease & Smith*, no. 25,789; cold chimneys in the schist at about 900–1000 m. alt., south of Fernald Pass, Mt. Mattaouisse, August 20, 1923, *Fernald & Smith*, no. 25,777; talus of mica-schist, chimney east of Razorback Ridge (alt. 850–1000 m.), Mt. Logan, July 13, 1923, *Pease & Smith*, no. 25,774; schistose talus at about 800–950 m. alt., Pease Basin, between Mts. Logan and Pembroke, July 13, 1923, *Pease & Smith*, no. 25,771 (exceptionally broad-leaved, cauline leaves to 6 mm. broad); cliffs and chimneys at about 800–1050 m. alt., east of Big Cascade, Pease Basin, between Mts. Logan and Pembroke, July 16, 1923, *Dodge & Pease*, no. 26,130; dry talus and ledges of green schists, at about 900–1125 m., Hanging Valley, Mt. Pembroke, July 16, 1923, *Griscom & Pease*, no. 25,775, 25,776, August 24, 1923, *Fernald & Smith*, no. 25,778. All distributed as *D. rupestris*. MAP 14.

MAP 14. Range of DRABA CLIVICOLA.

Draba clivicola, which was distributed as *D. rupestris* R. Br., differs quite obviously from that species in its very leafy stems, *D. rupestris* being typically scapose. Its reference to *D. norvegica* by Schulz has been noted in the discussion of the latter species; but it is sufficiently clear from that in its narrower cauline leaves, smaller flowers, more slender fruit and longer lower pedicels. So far as yet known, it is confined to the somewhat calcareous schistose upper slopes of the Mt. Logan region in Gaspé, a peculiarly notable area, where *D. clivicola* is associated with other endemic or near-endemic species: *Festuca prolifera* (Piper) Fern.,[1] *Draba Allenii* (see above), *Saxifraga gaspensis* Fern.[2] and *Vaccinium nubigenum* Fern.;[3] and such species, separated by hundreds or thousands of miles from their specific allies, as *Draba nivalis* Liljebl., *Potentilla emarginata* Pursh,[4] *Euphrasia Williamsii* Robinson, *Campanula uniflora* L.,[5] *Arnica Louiseana* Farr[6] and *Senecio resedifolius* Less.[7]

[1] RHODORA, XXXV. 133, map 14 (1933).
[2] RHODORA, XIX. 141 (1917).
[3] See RHODORA, XXXV. 279, map 23 (1933).
[4] The plant identified and reported as *P. fragiformis* Willd. in Mem. Amer. Acad XV. 280 (1925) is, according to the late Dr. Malte, *P. emarginata*.
[5] See Mem. Amer. Acad. XV. 338 (1925).
[6] See RHODORA, XXXV. 369, map 30 (1933).
[7] See RHODORA, XXVI. 113 (1924); also Mem. Amer. Acad. XV. 260, and map 29, p. 259 (1925).

14. D. **laurentiana**, sp. nov. (TABS. 304, 305), planta humifusa stragula 3–15 cm. diametro formans; caudiculorum ramis ramulisque albescentibus nitidis inferne foliis emortuis fibrillosis squamatis, superne foliis rosulatis cespitem 1.5–7 cm. diametro formantibus; foliis rosulatis cuneato-oblanceolatis 0.7–3.8 cm. longis 4–9 mm. latis crassis firmis acutis vel subacutis vel marginibus utrinque 1–3-dentatis stellato-pannosis; caulibus floriferis crassis simplicibus vel sparse ramosis, fructiferis 1–3.5 dm. altis imis piloso-hirsutis pilis simplicibus furcatis stellatisque admixtis; foliis caulinis (3) 6–25 (av. 10) oblongis plerumque 1–3 cm. longis 3–11 mm. latis argute 2–4-serrato-dentatis stellato-pannosis; racemis floriferis corymbiformibus fructiferis laxe elongatis 3–15 cm. longis 6–30-floris; pedicellis imis fructiferis 1.5–6 mm. longis ebracteatis vel rare bracteatis; sepalis ovalibus vel late oblongis late albido-marginatis 2.3–3 mm. longis 1.3–2.3 mm. latis; petalis lacteis late obovatis emarginatis 4.5–5 mm. longis 2.5–4 mm. latis; antheris 0.4 mm. longis; ovariis glabris 20–40-ovulatis; siliculis glabris oblongis ellipticis vel oblongo-lanceolatis planis vel tortis stylo brevissimo (0.1–0.4 mm. longo) coronatis 5–14 mm. longis 2–4 mm. latis, valvis valde reticulato-venosis vel rugulosis; seminibus a funiculis 0.3 mm. longis pendulis ellipticis 1–1.3 mm. longis.—Shores of the Gulf of St. Lawrence and Straits of Belle Isle, Newfoundland and eastern Quebec. NEWFOUNDLAND: limestone ledges, Schooner (or Brandy) Island, Pistolet Bay, July 18, 1925, *Pease & Long*, no. 28,359; dry rocky and gravelly limestone barrens, Cape Norman, July 18, 1925, *Wiegand, Griscom & Hotchkiss*, no. 28,360; turfy seashore east of Big Brook, July 15, 1925, *Pease & Griscom*, no. 28,357; Green Island, Straits of Belle Isle, July 24, 1925, *Griscom*, no. 28,364; fields and meadows, Flower Cove, July 12, 1920, *M. E. Priest*, no. E1; turfy limestone shore, Capstan Point, Flower Cove, July 10, 1925, *Fernald, Griscom & Gilbert*, no. 28,355; limestone ledges and gravel near the sea, St. Barbe, August 4, 1924, *Fernald, Long & Dunbar*, no. 26,713; turfy upper margin of limy gravel beach, Brig Bay, August 6, 1924, *Fernald, Long & Dunbar*, no. 26,714; turf overlying limestone, Grassy Island, St. John Bay, August 5, 1929, *Fernald, Long & Fogg*, no. 1731 (TYPE in Gray Herb.). QUEBEC: "Labrador," *Martin;* sur un îlôt de calcaire, riche en guano, Îslets de la Baie à Jean, 25 juillet, 1924, *Victorin & Rolland*, no. 18,256 (as *D. arabisans*); sur les rochers calcaires, Île Ste. Génévière, Mingan, 17 juilliet, 1924, *Victorin & Rolland*, no.

MAP 15. Range of DRABA LAURENTIANA.

DRABA LAURENTIANA, n. sp.: FIG. 1, portion of fruiting plant, × 1, from the TYPE; FIG. 2, portion of basal rosette, × 10, from the TYPE; FIG. 3, flower, × 10, from Newfoundland.

18,253; sur le cailloutis calcaire, Côté du Large, Île Ste. Génévième, 9 août, 1925, *Victorin & Rolland*, 21,477; rivages calcaires, Île Nue, Mingan, 29 juillet, 1926, *Victorin & Rolland*, no. 24,863; sur le cailloutis calcaire, Île à la Vache Marine, Mingan, 16 juillet, 1924, *Victorin & Rolland*, no. 18,251, as *D. arabisans;* sur les corniches calcaires, Île Quin, Mingan, 28 juillet, 1924, *Victorin & Rolland*, no. 18,244, as *D. arabisans*, var. *canadensis* (small bushy-branched and small-fruited extreme); sur les corniches calcaires, Île du Fantome, Mingan, 28 juillet, 1924, *Victorin & Rolland*, no. 18,246; sur le calcaire couvert de guano, Îlets Perroquets, Mingan, 5 août, 1924, *Victorin & Rolland*, no. 18,252, as *D. arabisans;* without statement of locality, Anticosti, June 26, 1861, *Hyatt, Shaler & Verrill.* Unless otherwise stated, distributed as *D. megasperma.* MAP 15.

Draba laurentiana is one of the coarser species of eastern America. Although confused in the herbarium with *D. glabella* Pursh, var. *megasperma* (Fern. & Knowlton) Fern. (PLATES 311, 312) and sometimes with *D. arabisans* Michx. (PLATES 314, 315), it stands apart from them both in the abundant spreading and simple pubescence of the lower internodes of the coarse flowering stems; *D. megasperma,* which is better treated as a large extreme of *D. glabella* Pursh, having the stems coarsely stellate-pannose, *D. arabisans* having them more finely stellate. The cauline leaves of *D. laurentiana* are commonly very numerous, usually 6–25 (average 10), those of *D. glabella* and its varieties few, 0–8, very rarely to 13 (average 4), and in *D. arabisans* they are much more narrowed at base and only 3–12 in number. The flowers of *D. laurentiana* are very large and the siliques distinctly rugose-veiny, with almost no style, while the silique of *D. arabisans* is veinless and long-styled. *D. glabella,* var. *megasperma,* in its largest development, is very similar to the less leafy plants of *D. laurentiana* and the two probably cross. In view of the marked difference in the pubescence of their lower internodes they are here treated as different species. It may later seem wiser to unite them as varieties of one variable species.

In northwestern Newfoundland and on the Mingan Islands *Draba laurentiana* has its greatest development, the material thought to be from Anticosti possibly having been actually collected elsewhere. In sharing the Gulf coast of Newfoundland and the Mingan Islands and, though only locally or doubtfully, Anticosti, it becomes one of a large series of species of similar occurrence: *Listera borealis* Morong, *Lesquerella Purshii* (Wats). Fern., *Arctostaphylos rubra* (Rehder & Wilson) Fern., *Arnica chionopappa* Fern., *Taraxacum laurentianum*

Fern., etc., which are each found on two or more of these segregated areas.

15. D. PYCNOSPERMA Fern. & Knowlt. Cespitose *perennial*, forming close or loose mats 0.2–2.5 dm. across: the pale slender mostly forking *caudices* retaining shreds of dead old leaves and *often with persistent bases of stellate trichomes*, ending in prostrate rosettes 1.5–10 cm. across: *rosette-leaves cuneate-spatulate to narrowly rhombic*, 0.7–5 cm. long, 2–15 mm. broad, entire or shallowly 1–3-dentate above the middle on each side, *finely and closely stellate-pannose: flowering stems* simple or with long ascending branches, in fruit 0.5–3.3 dm. high, very slender, *loosely to densely stellate-pubescent, often with admixture of forking and simple trichomes: cauline leaves* 1–4, *oblong to ovate*, 0.5–3 cm. long, 0.2–2 *cm. broad*, entire or 1–3-dentate on each margin, *sparsely hirsute* with simple, bifurcate and stellate trichomes *or glabrate: racemes in fruit very slender and lax*, 0.15–2 dm. long, 0.6–1.8 *cm. in diameter*, with pedicels mostly 3–12 mm. apart, with 5–40 siliques: pedicels finally loosely ascending, filiform, the lower 2–8 mm. long: *sepals oblong*, glabrous or hispid, 1.5–2 *mm. long*, 1 *mm. broad; petals white*, obovate, 2.7–3 *mm. long*, 2 *mm. broad:* anthers 0.2–0.3 mm. long: ovary glabrous: *siliques plump, compressed-ovoid, -ellipsoid or -oblong*, 2.5–10 mm. long, 1.8–3.3 mm. broad, *glabrous, with very short* (0.1–0.4 mm. long) but definite *style: seeds* 10–32, *closely imbricated and often turned oblique to the septum*, 1–1.4 mm. long.—RHODORA, vii. 67, t. 60, figs. 13–15 (1905); Ibid. xxviii. 201 (1926). *D. canadensis*, var. *pycnosperma* (Fern.) O. E. Schulz in Engler, Pflanzenr. iv[105]. 277 (1927).—Highly localized on limestones of northwestern Newfoundland and of eastern and northern Gaspé County, Quebec. NEWFOUNDLAND: dry limestone cliffs and talus, western face of Doctor Hill, *Fernald & Long*, no. 28,369. QUEBEC: dans l'Anse-à-l'Indien, sur les calcaires, Cap Gaspé, *Victorin, Rolland, Brunel & Rousseau*, nos. 17,379, 17,380, as *D. arabisans*, var. *orthocarpa;* wet limestone cliffs, Le Coulé, Percé, August 17, 1904, *Collins, Fernald & Pease* (*Pease*, no. 5450); crest of calcareous sea-cliffs, Cap Barré, Percé, August 16–20, 1904, *Collins, Fernald & Pease* (*Pease*, nos. 7361, 7359); sommet des "Trois Soeurs," Percé, *Victorin, Rolland, Brunel & Rousseau*, no. 17,375; dry calcareous rock, summit of Mt. Ste. Anne, Percé, July 24, 1905, *Williams, Collins & Fernald;* in a cold dark cave, near permanent snow, Mt. Ste. Anne, July 24, 1905, *Williams, Collins & Fernald;* Bonaventure conglomerate

MAP 16. Range of DRABA PYCNOSPERMA.

(calcareous), summit of Mt. Ste. Anne, *Fernald & Collins*, nos. 1071, 1072; sur les faces nues du conglomérate Bonaventure, vers 350 m. d'alt., Mt. Ste.-Anne, *Victorin, Rolland, Brunel & Rousseau*, no. 17,387; dry cliffs, Mt. Ste. Anne, *Pease*, nos. 19,239, 20,242; crests of calcareous sea-cliffs, Cap Blanc, Percé, August 17, 1904, *Collins, Fernald & Pease*, TYPE collection (*Pease*, no. 5437); steep face of Cap Blanc, *Collins & Fernald*, no. 94; Bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, *Fernald & Collins*, nos. 1073, 1074; blocs de conglomérat, Île Bonaventure, *Victorin, Brunel & Rousseau*, nos. 17,376, 17,377; falaîse de grès, Tourelle, *Rousseau*, no. 31,150. PLATE 306; MAP 16.

In its very plump siliques with crowded and usually obliquely-imbricated seeds and in its small flowers *Draba pycnosperma* should not be confused with any other species. Although Schulz reduces it to varietal rank, as *D. canadensis*, var. *pycnosperma*, it is very evident that he has completely misunderstood *D. canadensis*. *D. canadensis* Brunet (PLATE 315, FIGS. 3, 4 and 6) is a rather unimportant variation of *D. arabisans* Michx., differing from typical *D. arabisans* only in having slightly broader and flatter siliques (ovate and flat rather than lanceolate and twisted). It has all the technical characters of *D. arabisans:* oblanceolate entire or sparingly toothed rosette-leaves; flowering stems merely pannose-stellate (without elongate simple and bifurcate trichomes); cauline leaves narrow, merely stellate-pinnose (not hirsute) on the surfaces and rather numerous (6–9); pedicels divergent; sepals 2.5–3 mm. long; petals 4 mm. long; fruiting racemes compact, with subapproximate fruits, subcorymbiform to short-cylindric, 1.5–5 cm. long; siliques very flat; seeds not imbricated, lying flat against the septum. In contrast *D. pycnosperma* has broader rosette-leaves, flowering stems with simple and bifurcate trichomes mixed with the stellate ones, the 1–4 round-based cauline leaves often sparsely hirsute, the pedicels more ascending and relatively shorter, the sepals and petals definitely smaller; the fruiting racemes very slender and much elongate, with fruits becoming remote, the siliques very plump (½–⅔ as thick as broad), the crowded or imbricated seeds usually turned oblique to the rachis. The reasons for Schulz's reduction of *D. pycnosperma* to *D. canadensis* were, obviously, his unfamiliarity with the latter plant, coupled with his reliance solely upon the inconstant outline of the silique:

*Siliculae acutae, raro acuminatae.
†Semina 1–1,2 mm longa. Siliculae acutae.
. . . . . .
. . . . . .
††Semina vix 1 mm longa. Siliculae acuminatae. . . . 205. *D. arabisans.*

**Siliculae obtusiusculae vel rotundatae.

. . . . . .

††Siliculae parvae, 2,5–7 mm longae, ovoideae, apice rotundatae. . . . . 208. *D. canadensis.*

It will be noted that by ascribing to *D. canadensis* in his key "ovoid" (rather than flat and ovate) siliques Schulz was giving it a fundamental character of *D. pycnosperma.* Incidentally, Schulz made it clear that he did not personally know *D. canadensis*, his diagnosis of it, between quotation marks, being a latinization of the brief varietal description of *D. arabisans,* var. *canadensis* published by Knowlton and myself, with the siliques correctly described "Siliculae . . . elliptico-ovatae"; whereas *D. pycnosperma,* of which I had sent duplicates to Berlin, was accurately described: "Racemus . . . fructifer elongatus, laxus. Siliculae . . . . ovoideae, . . . valvis convexis subinflatae . . . . . Semina . . . densissime conferta."

Draba pycnosperma, known only from the region of Cape Gaspé and Percé, at the tip of the Gaspé Peninsula, where it is a very common and definite species, and from a single cliff-wall farther west and a single wall of the Doctor Hills of northwestern Newfoundland, has the peculiarly restricted relic-localization which characterizes most of the endemics of the region. In many cases, however, the endemics of the shores of the Gulf of St. Lawrence are found over extensive areas of either Gaspé, Anticosti, the Mingan Islands or western Newfoundland and also on one or another of the other areas (sometimes also the Magdalen Islands or St. Paul Island): such plants as *Draba laurentiana* (of western Newfoundland, the Côte Nord, the Mingan Islands and, perhaps, Anticosti), *Amelanchier Fernaldii* Wieg. (of western Newfoundland, Gaspé, the Magdalen Islands and St. Paul Island), *Primula laurentiana* Fern. (of Newfoundland, southern Labrador, the Mingan Islands, Anticosti, Gaspé and adjacent areas and the Magdalen Islands, with outlying colonies westward in Quebec and southward in Nova Scotia and Maine) and *Gentiana nesophila* Holm (of western Newfoundland, the Mingan Islands and Anticosti). But *D. pycnosperma,* although dominant at the extreme eastern end of the Gaspé Peninsula (Percé region, Bonaventure Island and Cape Gaspé), is otherwise known on the Gaspé Peninsula only from a single station more than 100 miles to the west; it is quite unknown from Anticosti and the Mingan Islands; and in Newfoundland it has been found only on a single cliff.

DRABA PYCNOSPERMA: FIG. 1, small fruiting plant from Île Bonaventure, Quebec; FIG. 2, rosette-leaves, × 10, from same station; FIG. 3, portion of internode, × 10, from Percé, Quebec; FIG. 4, septum and seeds, × 10, from Percé; FIG. 5, valve, × 10, from Percé.

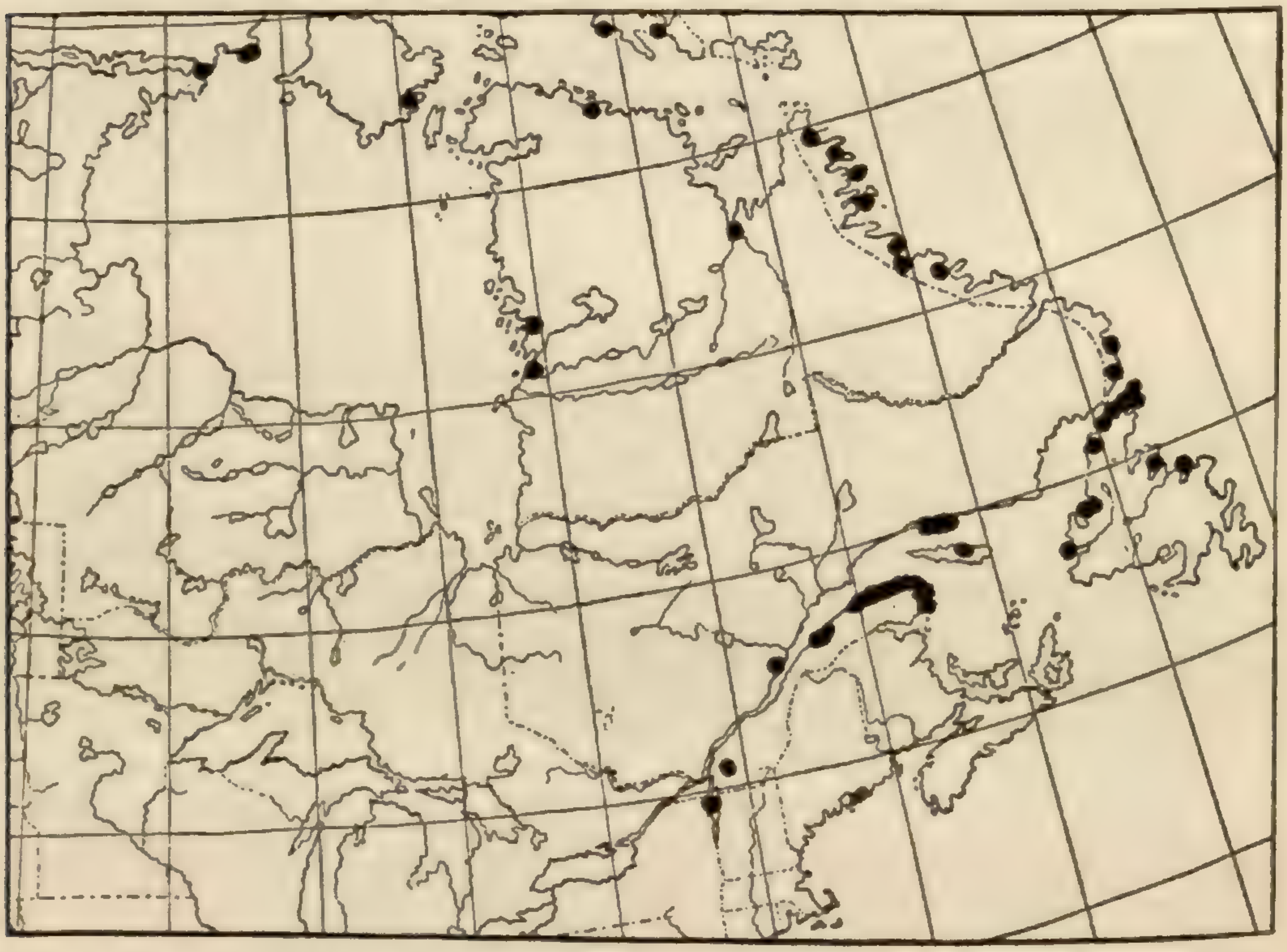
16. D. GLABELLA Pursh. Loosely to densely cespitose *perennial*, forming mats 0.2–2 dm. across: the pale slender mostly forking caudices retaining shreds of dead leaves, ending in depressed rosettes 1.5–8 dm. across: *rosette-leaves* cuneate-oblanceolate, oblanceolate-oblong or spatulate, dentate to entire, attenuate to the petiolar base, 0.7–4.5 cm. long, 2–10 mm. broad, *closely stellate-pannose*, in age sometimes glabrate: *flowering stems* simple to freely forking, 0.5–4 dm. high, *stellate-pannose*, only rarely with a few simple spreading trichomes, often glabrate at summit: *cauline leaves* 1 (rarely 0)–14, *ovate to oblong, tapering to rounded or subamplexicaul at base*, 1–3(–5)-dentate on each side or sometimes entire, 0.8–4 cm. long, 2–12 mm. wide, more or less stellate-pilose or glabrate: *racemes* corymbiform in flower, in fruit elongate, *usually lax*, the principal ones 0.3–1.5 dm. long with 5–35 subdistant siliques: *pedicels finally ascending, stoutish* (rarely very slender), *the lowest* 1–6 (rarely –8 or even 10) *mm. long: sepals* oblong, pilose to glabrous, 2–3 *mm. long*, 1–2 *mm. broad*, white-margined: *petals white*, broadly obcordate, unguiculate, 3–5.5 *mm. long*, 2–4 *mm. broad:* anthers about 0.4 mm. long: *siliques glabrous or more or less hirtellous* with stellate and bifurcate trichomes, *narrowly lanceolate to ovate-oblong*, 6–13 mm. long, 1.5–4 mm. broad, *with obsolete to short* (up to 0.5 mm. long) and *thick style*, compressed, *flattish*, rarely twisted, *the valves definitely veiny:* seeds 18–38, oblong to rounded, 0.7–1.3 mm. long.—A highly variable circumpolar species, represented in our area by four geographic varieties:

a. Siliques narrowly to broadly lanceolate, acute or subacute, 1.5–3 mm. wide: seeds 0.7–1 mm. long.
  Cauline leaves 1 (rarely 0)–5: longer racemes mostly with 5–15 (rarely –20) siliques ..... Var. *typica.*
  Cauline leaves 5–8: longer racemes mostly with 10–35 siliques ..... Var. *orthocarpa.*

a. Siliques elliptic to oblong-ovate, obtuse, 2.5–5 mm. wide: seeds 1–1.3 mm. long.
  Cauline leaves 1–4: plant of Greenland, Baffin Land and Hudson Strait ..... Var. *brachycarpa.*
  Cauline leaves 5–14: plant of Newfoundland, southeastern Quebec and eastern New Brunswick ..... Var. *megasperma.*

Var. **typica.** *D. glabella* Pursh, Fl. Am. Sept. ii. 434 (1814); DC. Syst. ii. 355 (1821) and Prodr. i. 172 (1824); O. E. Schulz in Engler, Pflanzenr. iv[105]. 275 (1927), in part only. *D. hirta* of Authors generally, not L. (1759), acc. to Elis. Ekman, Kgl. Svenska Vet.-Akad. Handl. lvii[3]. 13 (1917) and Svensk Bot. Tidskr. xxiv. 281 (1930); Reichenb. Ic. Pl. Crit. viii. t. dcclxviii (1830); Sv. Bot. xi. t. 768, fig. 1 (1838), very characteristic; O. E. Schulz, l. c. 267, in large part, incl. fig. 29, A–J (1927). *A. daurica* DC. Syst. ii. 350 (1821) and Prodr. i. 170 (1824); O. E. Schulz, l. c. 274, at least in part (1927); Elis. Ekm. Svensk Bot. Tidskr. xxiv. 285, t. iii. figs. 1–6 (1930). *D. Hennеana* Schlechtend. Linnaea, x. 100 (1836); O. E. Schulz, l. c. 276 (1927), in part, excl. at least the synonyms *D. incana*, var. *arabisans* Wats.,

D. Longii Schweinitz, *D. McCallae* Rydb. and *D. stylaris* Fern. & Knowlt. *D. dahurica* Fisch. ex Turcz. Bull. Soc. Nat. Mosc. (1838) No. 1: 87 (alteration of name). *D. magellanica* Lam., subsp. *borea* Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. lvii[3]: 44 (1917), in part (excl. at least the syn. *D. arabisans* Michx.). *D. hirta borea* (Elis. Ekm.) Ostenf. acc. to Ekm. in Hultén, Fl. Kamtch. ii. 161—Kungl. Svenska Vet.-Akad. Handl. ser. 3, v[2]. 161 (1928) as synonym.—Of wide range in the Arctic and Subarctic, extending south with us to Newfoundland, Quebec, Lake Champlain, New York, and shores of Hudson Bay. The following are characteristic. LABRADOR: on



MAP 17. Range in eastern America of DRABA GLABELLA (TYPICA).

granitic rock, old sea-beaches, Northwest Bank at Head of Ryan's Bay, *Woodworth*, no. 240½; Valley of the Twin Falls, Cape Mugford Peninsula, *Abbe*, no. 371; Okkak, *Moravian Bros., Sornborger*, no. 173 in part; Port Manvers, *Gardner*, no. 317a; Anatolak, *C. S. Sewall*, no. 519; gravelly moraine, Mouth of Frazer River (near Nain), *Harlow Bishop*, no. 325; Nain, *Henne*, TYPE of *D. Hennеana* Schlechtend. in Herb. Mus. Bot. Berol. (see PLATE 308, FIG. 2); Hopedale, *Gesner;* rocks at base of cliff, Dead Islands, *J. A. Allen*, no. 25; rocky hillsides, Battle Harbor, *Harlow Bishop*, no. 326. NEWFOUNDLAND: conglomerate-rock crests and crevices, shore of Dildo Run, New World Island, Notre Dame Bay, *Fernald, Wiegand & Bartram*, no. 5457; rocks, shores of Pike's Arm, *Fernald, Wiegand & Bartram*, no. 5458a; near seaward edge of Fishing Head, St. Anthony, *Abbe &*

Brooks, nos. 364, 365, 367; peaty and turfy brookside, Quirpon Island, *Fernald & Long*, no. 28,370; brookside on slaty hills back of Little Quirpon, *Fernald & Gilbert*, no. 28,365, as *D. megasperma:* slaty talus of Noddy Point, Mauve (or Noddy) Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,356; dry trap cliffs south of Ship Cove, Sacred Bay, *Fernald, Wiegand & Long*, no. 28,406, in part (mixed with *D. norvegica*); open peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,403; turfy or gravelly shelves, crests or talus of diorite, Ha-Ha Mountain, Ha-Ha Bay, *Pease & Griscom*, no. 28,379; gravelly limestone barrens near the sea, Eddy's (or Old Man's) Cove, *Fernald, Long & Fogg*, no. 1748½, transition to var. *megasperma;* dry gravelly limestone barrens, Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 1737, transition to var. *megasperma;* limestone cliffs near Stanleyville, Bonne Bay, *Fernald, Long & Fogg*, no. 1751; high sea-cliffs, Chimney Cove, *Waghorne*, no. 19, as *Arabis hirsuta;* dry limestone barrens, local, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,079. QUEBEC: limestone sea-cliffs, Île au Marteau (Eskimo I.), Mingan Islands, *St. John*, no. 90,476; sur les rochers calcaires, Île Ste.-Généviève, Mingan, *Victorin & Rolland*, no. 18,353; cailloutis calcaire du côté du large, Île Ste.-Généviève, Mingan, *Victorin & Rolland*, no. 21,471, as *D. megasperma;* sur les graviers et le cailloutis calcaires à l'embouchure, Rivière Vaureal, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 21,474; cliff-shores of Gaspé Bay, Douglastown, August 22, 1904, *Collins, Fernald & Pease* (*Pease*, nos. 7350, 7353), as *D. arabisans*, var. *orthocarpa;* Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease* (*Pease*, nos. 7357, 7358), as *D. arabisans*, var. *orthocarpa;* cold cliff, at 550 feet, Grande Coupe, Percé, August 19, 1904, *Collins, Fernald & Pease;* shaded calcareous cliffs of Little River, west of Percé, August 16, 1904, *Collins, Fernald & Pease* (*Pease*, no. 5094), as *D. arabisans*, var. *orthocarpa;* schistes nus, La Madeleine, *Rousseau*, no. 31,072; talus slope east of Rivière à Claude, *Kelsey & Jordan*, no. 65, as *D. arabisans*, var. *orthocarpa;* falaises escarpées et humides, Marsouins, *Victorin, Rolland & Jacques*, no. 33,676, as *D. arabisans*, var. *orthocarpa;* summit of talus and bases of calcareous cliffs west of Rivière aux Marsouins, *Fernald & Weatherby*, no. 2448; cliffs near Cap au Renard, *Pease*, no. 19,227; calcareous sea-cliffs and rock-slides by the Gulf of St. Lawrence, Christie, *Fernald & Pease*, no. 25,095; shaded cliffs, Cap Tourelle, August 19–21, 1905, *Collins & Fernald*, as *D. arabisans*, var. *orthocarpa;* calcareous headlands by the St. Lawrence, Grosses Roches, *Fernald & Pease*, no. 25,093; limestone and limestone-conglomerate ridges from Pointe aux Corbeaux to Cap Caribou, Bic, *Fernald & Collins*, nos. 1076, 1076[a]; sur le conglomérat nu, Cap aux Corbeaux, Bic, *Rousseau*, no. 26,442; près du Cap Enragé, Bic, *Victorin*, no. 9587; sur le conglomérat nu, Cap Enragé, *Rousseau*, nos. 26,503, 26,508, as *D. arabisans*, var. *orthocarpa;* mouth of Murray R., *Robt. Campbell* in Herb.

Geol. Surv. Can., no. 66,722, as *D. arabisans*, var. *orthocarpa;* Mt. St. Hilaire, Rouville Co., *Victorin*, no. 1052, as *D. arabisans*. NEW YORK: on limestone, Garden Island, Lake Champlain, near Valcour, July, 1892, *Brainerd*. UNGAVA: Ungava Bay, *L. M. Turner*, nos. 4842, 6316; Wakeham Bay, Hudson Strait, *Malte*, nos. 120,203, 120,209; "In Hudson's Bay. ⊙. *v. s.* in Herb. Banks," Pursh, l. c., TYPE of *D. glabella* at Brit. Mus. (see PLATE 308, FIG. 1); Richmond Gulf, *Spreadborough*, no. 16,272, *Low*, no. 63,144; Great Whale River, Hudson Bay, *Low*, no. 63,143. KEEWATIN: Fullerton, *J. M. Macoun*, no. 79,066, as *D. hirta*, var. *lejocarpa* Lindbl.; Chesterfield Inlet, *Gardner*, no. 377. Extending w. to Alaska. PLATES 307, 308; MAP 17.

Var. **orthocarpa** (Fern. & Knowlt.), comb. nov. *D. arabisans*, var. *orthocarpa* Fern. & Knowlt. RHODORA, vii. 66, in part only, but as to cited type, t. 60, fig. 11 (1905); O. E. Schulz, l. c. 276 (1927).—Quite like var. *typica* but more leafy, the cauline leaves 5–8, and with fuller racemes (siliques of well developed racemes 10–35).—Quebec and Keewatin. QUEBEC: rocky limestone headland, Pointe-aux-Esquimaux, Mingan, *St. John*, no. 90,485, transitional to var. *typica;* sur les corniches calcaires, Grande Île, Mingan, *Victorin & Rolland*, no. 21,469; cold rocks by permanent snow, Mt. Ste. Anne, Percé, July 24, 1905, *Williams, Collins & Fernald;* schistes, Chloridorme, *Rousseau*, no. 31,223; ledges near Pte. du Gros Mâle, *Pease*, no. 20,159; at base of calcareous slaty cliffs and talus, Cap Pleureuse, *Fernald & Weatherby*, no. 2447; dry calcareous cliffs, Cap Tourelle, *Fernald & Pease*, no. 25,094 in part (mixed with var. *typica*); calcareous cliffs, west of Méchins, *Fernald & Collins*, no. 582; low headland near the wharf (the old wharf), Bic, July 15–18, 1904, *Collins & Fernald*, TYPE of the var.; limestone and limestone-conglomerate ridges from Pointe aux Corbeaux to Cap Caribou, Bic, *Fernald & Collins*, no. 1212; rocher, Bic, *Rousseau*, nos. 24,831, 26,353, 26,389 and 26,548; island-headland north of Cap au Massacre, Bic, July 16, 1904, *Collins & Fernald;* rocky banks (conglomerate), Trois-Pistoles, *Victorin*, no. 30; rocks near the shore, L'Islet, *Victorin*, no. 3203; Îles Pelerins (Le Gros), Temiscouata Co., *Victorin*, no. 573. KEEWATIN: Churchill, *J. M. Macoun*, nos. 79,065, 79,068. PLATE 309; MAP 18.

MAP 18. Range of DRABA GLABELLA, VAR. ORTHOCARPA.

Var. **brachycarpa** (Rupr.), comb. nov. *D. hirta*, var. *brachycarpa* Rupr. Fl. Samojed. Cisural. in Beitr. Pflanzenk. Russ. Reiches, Lief. 2: 22 (1845); O. E. Schulz, l. c. 271 (1927).—A marked extreme of northernmost Russia and Siberia, Greenland, Baffin Island and the

DRABA GLABELLA: FIG. 1, flowering plant, × 1, from Newfoundland; FIG. 2, flowering plant, × 1, from Labrador; FIG. 3, fruiting stems, × 1, from near Nain, Labrador (type region of *D. Henneana*); FIG. 4, portion of basal rosette, × 10, from Newfoundland; FIG. 5, portion of internode, × 10, from Labrador; FIG. 6, tip of silique, × 10, from Newfoundland.

Hudson Strait region. UNGAVA: Wakeham Bay, Hudson Strait, *Malte*, nos. 118,919, 120,198, 120,243. PLATE 310; MAP 19.

Var. **megasperma** (Fern. & Knowlt.), comb. nov. *D. megasperma* Fern. & Knowlt. RHODORA, vii. 65, t. 60, figs. 6–8 (1905); O. E. Schulz, l. c. 277 (1927), excluding var. *leiocarpa* O. E. Schulz, l. c. which is a form of *D. arabisans*.—Southern Labrador, Newfoundland, eastern Quebec and northeastern New Brunswick. LABRADOR: cliffs by waterfall near shore, Forteau, *Fernald, Wiegand & Kittredge*, no. 3457. NEWFOUNDLAND: rocks, shores of Pike's Arm, *Fernald, Wiegand & Bartram*, no. 5458; damp peaty tundra, Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 28,362; damp turfy hollows in limestone barrens, Cape Norman, *Wiegand, Griscom & Hotchkiss*, no. 28,361; springy swales and turfy shores, Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,263; turfy slope near mouth of Big Brook, Straits of Belle Isle, *Fernald & Long*, no. 28,358; dry limestone cliffs and talus, western face of Doctor Hill, *Fernald & Long*, no. 28,371, transition to var. *typica* (distrib. as *D. hirta*); conglomerate limestone and calcareous sandstone cliffs and ledges, Cow Head, *Fernald & Wiegand*, no. 3456, as *D. hirta;* shelves and talus of diorite cliffs, Western Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1752, transition to var. *typica* (distrib. as *D. hirta*); banks, Rope Cove, *Waghorne*, no. 14, as *D. incana*. QUEBEC: upper slopes and crests, calcareous tableland, east of Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 3458; rock-crests, Vieille Romaine, Archipel Ouapitagone, *St. John*, no. 90,484, as *D. arabisans*, var. *orthocarpa;* Wolf Bay, long. 60° 13′, *Abbe*, no. 1261; top of limestone shingle, Île Ste.-Généviève, Mingan, *St. John*, no. 90,475; sur les graviers calcaires, Île Ste.-Généviève, *Victorin & Rolland*, nos. 18,245, 21,476 and 24,861 (as *D. arabisans*); rivages, Île à la Chasse, Mingan, *Victorin & Rolland*, no. 24,867; sur les rochers calcaires, Île St.-Charles, Mingan, *Victorin & Rolland*, no. 18,254, 18,255; sur les corniches calcaires, Île Tête à la Baleine, Mingan, *Victorin & Rolland*, nos. 21,466, 21,472; sur les cailloutis calcaires, Île à la Vache Marine, Mingan, *Victorin & Rolland*, no. 18,257; lieux herbeux sur un îlôt

MAP 19. Southeastern Extension in America of Draba GLABELLA, var. BRACHYCARPA.

MAP 20. Range of DRABA GLABELLA, var. MEGASPERMA.

d'oiseaux, Île Nue, Mingan, *Victorin & Rolland*, no. 24,866 (very lax state); sur les déserts caillouteux du côté ouest, Île Nue, *Victorin & Rolland*, no. 24,869 (dwarfed state); prairie naturelle, Île aux Calculeaux, Mingan, *Victorin & Rolland*, no. 21,478; rivages calcaires, Île à Marteau, Mingan, *Victorin & Rolland*, no. 24,862 (as *D. arabisans*); sur les graviers calcaires, Grande Île, Mingan, *Victorin & Rolland*, no. 21,481 (transition to var. *orthocarpa*); sur les graviers du Barachois, Lac à la Croix, Anticosti, *Victorin & Rolland*, no. 27,312; sur les graviers du Barachois, Rivière Dauphine, Anticosti, *Victorin & Rolland*, no. 27,313; sur les bords d'alluvion de la Rivière Belle, Anticosti, *Victorin & Rolland*, no. 27,314; sur le Barachois, Crique de la Chaloupe, Anticosti, *Victorin & Rolland*, no. 24,865; low islands near Becsies River, Anticosti, *Victorin*, no. 3140 (as *D. arabisans*); Anse au Sanatorium, Anticosti, *Victorin*, no. 4134 (as *D. arabisans*); rocks near the sea-shore, Tourelle, July 13, 1881, *J. A. Allen;* sea-cliffs east of Ste. Anne des Monts, Tourelle, *Griscom, Mackenzie & Smith*, no. 25,770; grès denudés, Tourelle, *Rousseau*, no. 31,151; dry sandstone sea-cliffs, Capucins, *Fernald & Collins*, no. 583; limestone-conglomerate boulders in woods, Gros Crépaud, *Fernald & Collins*, no. 580; gravelly beach at Paspébiac Lighthouse, July 26, 1902, *Williams & Fernald* (TYPE of *D. megasperma*); dry gravel-beach, Paspébiac, *Collins & Fernald*, no. 91, July 27, 1902, *Churchill;* same station, *Victorin, Rolland & Jacques*, no. 33,774. NEW BRUNSWICK: dry gravel-pavement back of the beach, Belledune Point, *Fernald & Pease*, no. 25,092; near Bathurst (probably the preceding station), July, 1881, *C. Linden*. PLATES 311, 312; MAP 20.

Draba glabella is the most variable of our species, embracing not only much of the *D. hirta* of authors but many variations which have sometimes been given specific rank and scores of proposed subspecies, varieties and forms. As to the Linnean *D. hirta*, Mrs. Ekman has clearly shown that the primary type was material of the plant subsequently described as *Braya alpina* Sternb. & Hoppe.[1] Consequently, the next available name must be taken up. Mrs. Ekman at first united the boreal plant with the subantarctic *D. magellanica* Lam., but afterward withdrew it in large part and treated it, apparently correctly, as *D. daurica* DC. (1821). She made the mistake, however, of uniting with it *D. arabisans* Michx. (PLATES 314, 315), and she suspected, what, unfortunately, she did not follow up, that *D. daurica* (1821) was inseparable from *D. glabella* Pursh (1814): "Die *D. glabella* müsste wohl ihrem Namen gemäss der leiocarpen

[1] This Old World species should, of course, be called BRAYA **hirta** (L.), comb. nov. *Draba hirta* L. Syst. Nat. ed. 10, ii. 1127 (1759) and Sp. Pl. ed. 2, ii. 897 (1763). *B. alpina* Sternb. & Hoppe, Denkschr Regensb. i[1]. 66 (1815).

For detailed exposition of the typification see Elis. Ekman, Kgl. Svenska Vet. Akad.-Handl. lvii.[3] 13 (1917) and Svensk Bot. Tidskr. xxiv. 281 (1930).

Unterart, subsp. *borea* [of *D. magellanica*], entsprechen" (Ekm., Kungl. Sv. Vet.-Akad. Handl. lvii³. 49); "I have not seen the type of *D. glabella* Pursh which is derived from Arctic America, but it would not surprise me if this plant were identical with a glabrous form of *D. daurica*" (Ekm. Svensk Bot. Tidskr. xxiv. 287).

The latter surmise of Mrs. Ekman was correct. Pursh explicitly stated that his type of *Draba glabella* was in the Banks Herbarium (at the British Museum). A photograph (PLATE 308, FIG. 1) of this type, most generously supplied by Mr. J. Ramsbottom, with a detailed description of it by Mr. A. W. Exell, settles that point; and, so far as I can find, *D. glabella* Pursh is the earliest name for the variable circumpolar "*D. hirta*." The name given by Pursh, *D. glabella*, was misleading in its connotation, so much so that practically all students, refraining from an examination of the readily accessible type, have quite misinterpreted it. Thus Hooker, who probably knew the original material and who correctly described it, made a comparison of the leafy-stemmed and comparatively large *D. glabella* with the scapose and pygmy *D. crassifolia* (PLATE 294) which threw later students off guard: "This has more the habit of *D. crassifolia* than of the following [the excessively leafy and villous *D. confusa*]; but it is three or four times the size, and has flowers as large as any in the genus."[1]

Hooker's comparison of *Draba glabella* with the really very different *D. crassifolia* was repeated by Torrey & Gray and its reiteration by others has tended further to obscure the true identity of Pursh's species. As a matter of fact, the specific name used by Pursh should be taken in the sense he presumably meant it and with appreciation of the almost microscopic character of the trichomes in his species. He enumerated three species with leafy stems: the very distinct *D. arabisans* Michx., *D. incana* L., described "D. foliis caulinis numerosis incanis, pilis implexis," and the much less obviously pubescent new species, *D. glabella* "foliis . . . glabriusculis." As compared with the villous *D. incana*, *D. glabella* has, to use Daydon-Jackson's definition, SOMEWHAT GLABROUS (*glabriusculus*) leaves. Mr. Exell's close examination of the type material, however, results in the following diagnosis: rosette-leaves stellate-pubescent; stem and cauline leaves with stellate and very short forked trichomes; pedicels mostly stellate-pubescent; siliques stellate-pubescent. In other words, in-

[1] Hook. Fl. Bor.-Am. i. 54 (1830).

stead of being essentially glabrous, the type of *D. glabella* is stellate-pubescent throughout under a lens! Had he understood *D. glabella*, Schulz would hardly have treated it as a species wholly apart from "*D. hirta*," *D. daurica*, *D. Henneana* and *D. megasperma*. In his key (his pp. 204 and 205) he places *D. hirta*, *D. daurica* and *D. glabella* under a section "*Siliculae acutae, raro acuminatae," while *D. Henneana* and *D. megasperma* are set off from them by "**Siliculae obtusiusculae vel rotundatae," although in the fuller treatment (p. 275) this key-differentiation becomes confused by the "acute"-fruited *D. glabella* being assigned "Siliculae oblongo-ellipsoideae, apice obtusiusculo." "*D. hirta*" is correctly assigned, in the key, "Caules et folia pube stellata minuta obtecta," while *D. glabella*, the type (PLATE 308, FIG. 1) of which is also stellate-pubescent throughout, is separated merely by "Caules et folia glabrescentia," a difference which would be wholly unimportant even if it were so.

As to *Draba daurica* DC., which Schulz separates from "*D. hirta*" in his key because it has "Folia caulina superiora basin versus manifeste cuneatim angustata," while "*D. hirta*" was placed under the leading division "Folia caulina superiora basin versus dilatata vel vix cuneata," it is apparent from the type of *D. daurica* (PLATE 308, FIG. 3) that Schulz could not have taken the trouble to check that important specimen at Geneva. The type, for the photograph of which I am greatly indebted to Dr. Alfred Becherer and Mr. J. F. Macbride, clearly shows the uppermost leaf "basin versus dilatata," the character ascribed by Schulz to *D. hirta*. The type thus agrees with DeCandolle's original description of *D. daurica*, "Folia . . . caulina pauca, ovata, subacuta," and not very satisfactorily with Schulz's key-character for *D. daurica:* "basin versus manifeste cuneatim angustata." Incidentally, the type of *D. daurica* has the young siliques lance-acuminate, a character not sharply brought out by the "Siliculae . . . oblongae" of Schulz's diagnosis. In his detailed diagnosis DeCandolle said "Caulis . . . pilis simplicibus basi confertioribus apice raris subpuberulus" and Mr. Macbride independently writes that the leaves have unequally forked stellate trichomes and that the leaf-margins and the stems (below densely, above very sparsely) are pubescent with long simple and once-forked weak hairs interspersed, at least below, with unequally stellate trichomes like those of the leaves. In their relative abundance on the base of the stem *D. daurica* somewhat departs from the typical

eastern American *D. glabella*. It seems, however, to be one of the variants of that species.

Draba Henneana Schlechtendal was based on a plant collected at Nain, Labrador by the Moravian missionary, Henne. It was given the very detailed and wholly accurate description which characterized the work of Schlechtendal and distinguished him as one of the really great German phytographers. In his account of the type of *D. Henneana*, Schlechtendal described the young fruits: "siliculis pedicello suo longioribus anguste ellipticis brevissimo stylo apiculatis et ut omnes reliquae partes plantae pilis stellatis simplicibusque obsessis." The type specimen of *D. Henneana* (PLATE 308, FIG. 2), now unfortunately much broken, has most liberally been sent to me from Berlin by Dr. Milbraed. So far as I can see it is inseparable from the pubescent-fruited individuals of "*D. hirta*," from the common run of Labradorean *D. glabella* (the type of which is also stellate throughout) and from *D. daurica*. Although the type of the latter has quite glabrous ovaries, while those of the types of *D. glabella* and of *D. Henneana* are pubescent, this character alone is so very fickle in the species that I am inclined to ignore it. The siliques throughout the series of North American varieties range from quite glabrous, through an intermediate series with scabrous or hirtellous surfaces, to a few which are more positively stellate-hirsute. There seems to be no geographic nor taxonomic significance to the character in this particular species.

For some reason, which I am wholly at a loss to explain, Schulz segregates from his true *Draba Henneana* (originally described by Schlechtendal "siliculis . . . pilis stellatis simplicibusque obsessis") the individuals with pubescent siliques as a separate

Var. **McCallae** (Rydberg) O. E. Schulz [spelled by Schulz Mac Callae]—*D. McCallae* Rydberg in Bull. Torrey Bot. Club XXIX. (1902) 241. *D. stylaris* Fernald and Knowlton in Rhodora VII. 76. (1905) 64, pro parte, non Gay.—Siliculae pilis brevibus simplicibus bifurcis intermixtis obsitae.

As conceived by Schulz, therefore, his var. *McCallae* differs from true *D. Henneana*, accurately described by Schlechtendal "siliculis . . . pilis stellatis simplicibusque obsessis," by having the almost identical character: "Siliculae pilis brevibus simplicibus bifurcis intermixtis obsitae." Further to elucidate his understanding of the matter, Schulz, under his glabrous-fruited *D. Henneana* cited the single type specimen as belonging to both!: "Nain (Missinar H e n n e, auch var. *Mac Callae*)"! Although the description and at least the

Labrador specimens cited by Schulz as showing his conception of his *Draba Henneana*, var. *McCallae* belong to typical *D. Henneana*, therefore to *D. "hirta,"* to *D. daurica* and to *D. glabella*, they have no close relationship to *D. McCallae* Rydb. The latter species is a very clear-cut plant of the northern Rocky Mountains. The type of it (PLATE 313, FIGS. 1 and 5), which Dr. Gleason has most kindly allowed me to have photographed, has very softly pilose stems, with few if any of the sessile or subsessile stellate trichomes which so closely cover the surface in *D. glabella* (including *Henneana*); instead, the lower internodes (PLATE 313, FIG. 4) are copiously pilose to villous with long and soft spreading or retrorse simple hairs. The leaves (FIG. 3), too, have a sparser but longer and mostly simpler (or merely bifurcate) pubescence than in *D. glabella*. The flowering raceme is promptly, instead of tardily, elongate, and in full maturity (as shown by ripe fruiting plants, FIG. 2) it is ⅔ the full length of the stem (much as in *D. aurea*), with very slender and elongate pedicels. The siliques (FIG. 6), both in the type and in ripe material of *D. McCallae*, are oblique or semilunate and covered with more spreading pubescence than in *D. glabella*. *D. McCallae*, in the abundant spreading and mostly simple pubescence of the siliques and in its elongating flowering raceme, is very near the Asiatic *D. dasycarpa* C. A. Meyer, so beautifully shown in Ledeb. Icon. Pl. Fl. Ross. iii. t. 264 (1831). Its identification with *D. Henneana*, the type of which is "also var. *MacCallae* (auch var. *MacCallae*)" could have resulted only from complete misunderstanding of it.

As to the citation under Schulz's var. *McCallae* of "*D. stylaris* Fernald and Knowlton . . . pro parte," this was apparently due to the inclusion, erroneously, by Knowlton and myself of the synonym *D. Henneana*, about which we then knew nothing but the description, under *D. stylaris*. One or two other synonyms of *D. Henneana* given by Schulz demand a word of clarification. Under his typical *D. Henneana* he includes in the synonymy *D. arabisans* Michx., β. Torr. & Gray, Fl. N. Am. i. 106 (1838) and *D. Longii* Schwein. ex Torr. & Gr. l. c. as syn. Without entering now into specifications, it should be noted that the original sheet in the Torrey Herbarium of *D. arabisans*, β. T. & G. (based on the manuscript *D. Longii*) bears very detailed notes by Torrey and is a characteristic Great Lake form of *D. arabisans*, just as Torrey & Gray correctly decided. It does not belong to *D. glabella* (including *D. Henneana*).

As to numerous other synonyms placed by various authors under *Draba "hirta," D. glabella, D. daurica* and *D. Henneana,* I am not situated to judge correctly of their status. The unwisdon of guessing at the identities of Drabas (or any other plants) by descriptions alone should be evident. The failure to recognize this elementary principle of sound taxonomic and nomenclatural study has been sufficiently emphasized in the preceding discussion. Without knowing from actual study of the types or of undoubted authentic specimens, I must pass by varietal names which, ultimately, may have to replace some which I am here using. With the exception of one (var. *brachycarpa*), the names used under *D. glabella* have been verified by examination of the taxonomic and nomenclatural types.

As already stated, the occurrence of slight pubescence on or its absence from the siliques in the wide-ranging *D. glabella* does not seem to me sufficiently constant to be used in breaking the species into its geographic varieties. The four marked trends which I have recognized in eastern America pass more or less into one another but they have their own primary centers of distribution and seem to be fairly definite geographic varieties. Var. *typica* (PLATES 307, 308), with few cauline leaves, acute or acutish, lanceolate siliques and relatively small seeds, is generally dispersed around the North and extends southward into the area of two of the varieties.

In the region of the Lower St. Lawrence and the Gulf and to some extent in the Hudson Bay area there occurs a more leafy extreme (cauline leaves up to 8) which, when well developed, has more numerous flowers and fruits than the more boreal type. This is var. *orthocarpa* (PLATE 309). When it was first published as *D. arabisans,* var. *orthocarpa* Fern. & Knowlt. our understanding of *Draba* was most rudimentary. Some of the cited specimens belong to *D. arabisans* as I now conceive it, others were very typical *D. glabella* and a few, including the TYPE-specimen (PLATE 309), were of the leafier variation of *D. glabella.* It becomes necessary, therefore, to recast the very confused conception which was originally expressed by *D. arabisans,* var. *orthocarpa.*

Var. *brachycarpa* (PLATE 310) barely reaches our area. The eastern American material I have seen is abundant specimens from Greenland, a few from Baffin Island and one collection from northern Ungava. I have seen no authentic material identified by Ruprecht, but his description was so good that I have followed Schulz in placing in var. *brachycarpa* the broad-fruited Greenland plants.

Var. *megasperma* (PLATES 311, 312), although originally put out as a species and so maintained by Schulz, clearly passes into var. *orthocarpa* and in fruit alone is scarcely separable from the more boreal var. *brachycarpa*. It differs from the latter in its greater size and more numerous leaves and is, doubtless, a Newfoundland and Gulf of St. Lawrence representative of the Greenland plant. Closely simulating var. *megasperma* but even more leafy is the newly proposed *D. laurentiana* (PLATES 304, 305). This plant, localized in much the same area as var. *megasperma*, differs from it, not only in its greater leafiness but in the abundant simple spreading pubescence of the lower internodes. Eventually it may seem right to treat it as another extreme variety of *D. glabella*. If, however, we abandon the character of pubescence in the classification of *Draba*, the whole structure must collapse. This dependence on the character of the trichomes is one of the least insecure reliances in the group; and, for the present, I am hopefully clinging to it!

One more name must be noted. This is *Draba megasperma*, var. *leiocarpa* O. E. Schulz, l. c. 277, based on *Collins & Fernald*, no. 93, from Bic, Quebec (PLATE 315, FIGS. 1 and 5). This material was originally included in the mixed *D. arabisans*, var. *orthocarpa*, but it differs from the cited type (PLATE 309) in actually having all the significant characters of *D. arabisans* with plane siliques: the long pedicels, long style and the smooth (not veiny) surfaces of the very thin and acute siliques. It does not belong with *D. megasperma* (PLATES 311, 312), which has the obtuse siliques much broader, on shorter and thicker pedicels and with nearly obsolete style, the less flattened siliques with veiny or rugose surfaces.

(*To be continued*)

DRABA GLABELLA: FIG. 1, TYPE, × 1, in Herb. Brit. Mus. (photograph from the Keeper, Mr. J. RAMSBOTTOM); FIG. 2, type of *D. Henneana*, × 1, in Herb. Bot. Mus. Berlin-Dahlem (photograph by *L. B. Smith*, from original specimen loaned by the Curator, Professor JOHANNES MILBRAED); FIG. 3, type of *D. daurica*, × 1, in Herb. De Candolle, Genève (photograph presented by Dr. ALFRED BECHERER and Mr. J. F. MACBRIDE).

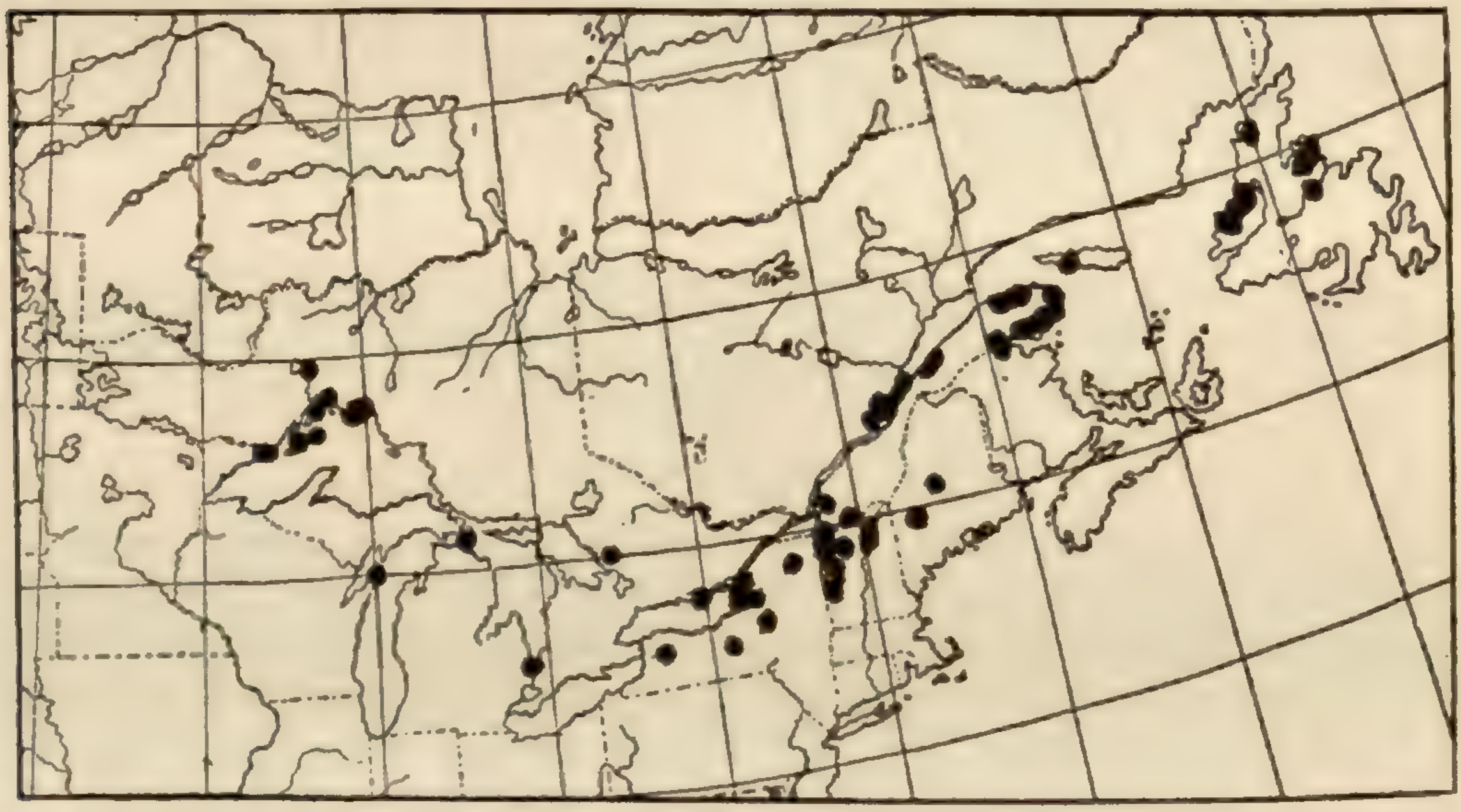
DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. Fernald

(*Continued from page 344*)

17. D. ARABISANS Michx. More or less cespitose *perennial*, forming simple or freely forking mats 0.2–2.5 dm. across, the drab or pale-brown mostly forking caudices retaining fibrous shreds of dead leaves, ending in depressed rosettes 1.5–14 cm. across: *rosette-leaves* oblanceolate or spatulate, entire or somewhat dentate, attenuate to a petiolar base, 0.7–7 cm. long, 0.2–1.6 cm. broad, *thin, closely and minutely* (in shade more sparsely and less minutely) *stellate-pannose*, in age sometimes glabrate: *flowering stems* 1–40, slender, simple to freely branching, *with* often *flexuous* loosely ascending *branches*, 0.5–4.5 dm. high, glabrous or sparingly to closely *stellate-tomentulose*, rarely with a few spreading and simple trichomes, often glabrate at summit; *cauline leaves* 3–12, oblanceolate, oblong or narrowly obovate, *cuneate to but slightly rounded at base*, serrate-dentate to entire, 0.5–4.5 cm. long, 0.2–1 cm. broad, stellate-pubescent to glabrous: *racemes* corymbiform in flower, *elongating in fruit and rather lax;* the *primary ones* 7–25-flowered, *in fruit* becoming 2–12 cm. long and 1.3–3 *cm. in diameter: pedicels slender*, glabrous or sparsely stellate-pilose, *divergent or arched-ascending, the lowest* 3–15 (rarely –25) *mm. long:* sepals oblong, obtuse, 1.8–3 mm. long, 1–1.5 mm. broad, glabrous or sparsely hirtellous, white-margined: petals white, broadly obovate, emarginate, unguiculate, 4.5–6 mm. long, 2.8–3.8 mm. broad: anthers 0.5 mm. long: *ovary glabrous, with a distinct slender style: siliques very thin*, strongly compressed, *glabrous*, narrowly lanceolate to narrowly elliptic or ovate, *commonly acuminate*, usually twisted but sometimes

plane, 5–15 mm. long, 1.5–3 mm. broad, *with slender style* 0.5–1 *mm. long; the valves smooth and veinless*, often lustrous: seeds 12–36, oblong or rounded, 1.1–1.7 mm. long.—Fl. Bor.-Am. ii. 28 (1803); DC. Syst. ii. 349 (1821); Torr. & Gray, Fl. N. Am. i. 106 (1838), in large part; Gray, Gen. i. 160, t. 68 (1848); Fern. & Knowlt. Rhodora, vii. 65, t. 60, fig. 9 (1905); O. E. Schulz, l. c. 275 (1927). *D. Arabis* Pers. Syn. ii. 190 (1807). *D. incana*, var. *glabriuscula* Gray, Ann. Lyc. Nat. Hist. N. Y. iii. 223 (1835). *D. Longii* Schwein. ex Torr. & Gray, l. c. (1838) as synonym. *D. incana*, var. *arabisans* (Michx.) Wats. Proc. Am. Acad. xxiii. 260 (1888). *D. arabisans*, var. *orthocarpa* Fern. & Knowlt. l. c. 66 (1905), in part only and excluding the cited type.—Cliffs and exposed ledges of argillaceous, basic or calcareous



Map 21. Range of Draba arabisans.

rock, Newfoundland to the Lake Superior region of Ontario, south, rather locally, to New Brunswick, Maine, Vermont, New York, Michigan, Wisconsin and Minnesota.—Newfoundland: dry cliffs and talus, Tilt Cove, *Fernald, Wiegand & Darlington*, no. 5463; dry rocks, Snook's Arm, *Fernald, Wiegand & Darlington*, no. 2462; ledges and talus, north bank of Exploits R., Grand Falls, no. 5461; calcareous cliffs, ledges and talus, Bard Harbor Hill, *Fernald & Long*, no. 28,367, *Wiegand, Gilbert & Hotchkiss*, no. 28,368; dryish limestone talus, Doctor Hill, *Fernald & Long*, no. 28,366; limestone near crest (alt. 650 m.), Killdevil, Bonne Bay, *Fernald, Long & Fogg*, nos. 1739, 1740; limestone ledges and talus, Shag Cliff, Bonne Bay, *Fernald, Long & Fogg*, no. 1738; dry limestone shingle and talus, Penguin Head, Bay of Islands, *Fernald, Long & Fogg*, no. 1736; dry limestone talus, Druid's (or Raglan) Head, Bay of Islands, *Fernald, Long & Fogg*, no. 1735; slaty cliffs, McIver's Cove, Bay of Islands, *Fernald, Long & Fogg*, no. 1732; sea-cliffs, John's Beach, Bay of

Islands, *Waghorne*, no. 22; cliffs along shore, near Frenchman's Cove, Bay of Islands, *Mackenzie & Griscom*, nos. 10,268, 10,289; talus slopes of marble region between Mt. Musgrave and Humbermouth, *Fernald, Wiegand & Kittredge*, no. 3459; dry limestone ledges and shingle, Hannah's Head, lower Humber Valley, *Fernald, Long & Fogg*, no. 1733. QUEBEC: on shingle, West Point, Anticosti, *J. Macoun* no. 20; dry (inland) calcareous cliffs near Cape Gaspé, *Pease*, no. 20,205; rochers calcaires de la Montagne St.-Alban, vers 300 m. d'alt., *Victorin, Rolland, Brunel & Rousseau*, nos. 17,382, 17,383; talus of calcareous cliffs near Cape Rosier, *Pease*, no. 20,208; calcareous cliffs, Mt. Ste. Anne, Percé, August 18, 1904, *Collins, Fernald & Pease* (*Pease*, nos. 7355, 7356), *Fernald & Collins*, no. 1070, *Victorin, Rolland, Brunel & Rousseau*, no. 17,378, *Pease*, no. 20,241; rocky slope, Round Rock, Grand River, Gaspé Co., June, 1903, *G. H. Richards*, June 30–July 3, 1904, *Fernald;* dry slaty talus of cliffs east of the head of Lac Pleureuse, *Fernald, Dodge & Smith*, no. 25,772; sur les cailloutis calcaires près du Lac Pleureuse, *Victorin, Rolland & Jacques*, no. 33,437; calcareous cliffs and rock-slides by the Gulf of St. Lawrence, Christie, *Fernald & Pease*, no. 25,090, 25,091; trap cliffs at 1800–1900 feet, Tracadigash Mt., Carleton, July 24, 1904, *Collins, Fernald & Pease* (some fruits with 3 carpels); calcareous ledges and cliffs, Bic, many collections, July 16 and 18, 1904, *Collins & Fernald*, July 17, 1904, *Collins & Fernald, Fernald & Collins*, nos. 92, 93 (cotype of *D. megasperma*, var. *leiocarpa* O. E. Schulz), 1066, 1067, 1069, *Rousseau*, nos. 24,833, 26,487, 26,613, 26,695, 26,703, *Victorin, Rolland & Jacques*, no. 33,586; crevices and talus of limestone sea-cliffs, alt. 200–275 m., east of St. Fabien, *Fernald & Collins*, no. 1068; rochers, Île à Deux Têtes, *Victorin*, no. 24,839; argilite, Île aux Grues, *Rousseau*, no. 24,841; Cap à la Branche, Île-aux-Coudres, *Victorin*, no. 4128; sur les roches cambriennes, Grosse-Îlse, *Victorin*, nos. 15,638, 15,639; dry calcareous cliffs near the shore, Baie St. Paul, *Stebbins*, no. 783; rochers abrupts, Mt. St.-Hilaire, *Victorin*, no. 3867; dry, calcareous cliffs, Gibraltar Point, Lake Memphremagog, *Pease*, no. 11,981. NEW BRUNSWICK: slaty bank, junction of Restigouche and Matapedia Rivers, Quebec-New Brunswick boundary, *Rousseau*, no. 32,335. MAINE: Mt. Kineo, September, 1887, *G. G. Kennedy;* moist ledges, at 1300 ft., Day Mt., Avon, July 24, 1903, *Knowlton*, August 31, 1904, *Knowlton & Chamberlain*. VERMONT: cliffs and summits about Willoughby Lake (Mt. Annance, Mt. Hor, Mt. Pisgah, etc.), many collections from 1854 (*Wm. Boott*)—date; Smuggler's Notch, many collections from 1877 (*Faxon*)—date; "in rupibus ripariis ad lacum *Champlain* et in Nova Anglia," *Michaux* (TYPE in herb. Michx., Mus. d'Hist. Nat. Paris); Gardiner's Island, L. Champlain, June 17, 1881, *Faxon*, July 2, 1898, *Eggleston;* Four Brothers Island, L. Champlain, June 12, 1908, *N. F. Flynn;* dry ledges, Shelburne Point, L. Champlain, June 25, 1913, *Knowlton;* Charlotte, June 9, 1876, *Pringle;* dry ledges, Mt. Philo, Charlotte, June 5, 1908, *Kennedy*, May 28,

1922, *Knowlton;* Snake Mt., Addison, *Eggleston,* no. 132; limestone cliffs, Cobble Hill, South Bristol, May 28, 1878, *Brainerd;* Mt. Eolus, Dorset, September, 1901, *E. H. Terry.* New York: southeast face of Wallface Mt., above southern end of Indian Pass, at 3200 ft. alt., Essex Co., *House,* no. 9436; rocky banks of lakes in St. Lawrence and Jefferson Counties, 1833 and 1834, *Asa Gray* (type of *D. incana,* var. *glabriuscula*); on rocks, Trenton Falls, June, ——, no. 72 (herb. Torrey); Sackett's Harbor, *W. A. Wood;* Burdick's Glen, Lansing, June 16, 1885, *Dudley;* dry rocks, small ravine north of Esty's Glen, Lansing, *A. J. Eames,* no. 12,081; near Akron, Erie Co., 1864, *Clinton.* Ontario: sand-dunes, Picton, June 26, 1886, *Fowler;* plentiful on Lake Muskoka, June, 1916, *N. Tripp* (Herb. Univ. Mich.); North Shore, Lake Superior (between Sault Ste. Marie and Michipicoten), *Loring;* Jack Fish, June 26, 1898, *J. Fletcher;* very abundant on cliffs and gravel, Jack Fish, *Pease,* no. 23,487; dry cliffs, Northern Slate Island, Thunder Bay Distr., *Pease,* no. 23,633; Mt. McKay, September 7, 1889, *Britton, Britton & Timmerman;* Lake Nipigon, July 8, 1884, *J. Macoun.* Michigan: Fort Gratiot, *Dr. Z. Pitcher* (type of *D. arabisans* β. Torr. & Gray and of *D. Longii*), in herb. Torrey; bluffs and ledges, Mackinac Island, July 2, 1897, *E. T. & S. A. Harper,* and numerous later collectors; limestone rocks, Prentis Bay, Mackinac Co., *Ehlers,* nos. 1103, 1352, *C. & E. Erlanson,* no. 648; Isle Royale, 1868, *G. A. Marr, A. E. Foote,* also *W. S. Cooper,* no. 40, in part (partly var. *canadensis*); base of Monument Rock, Isle Royale, *McFarlin,* no. 2174; island in Rock Harbor, Isle Royale, *McFarlin,* no. 2246; rock-crevices, Passage Island, August 25, 1930, *Povah & Brown;* wind-swept sandstone-conglomerate crest of Lookout Mt., Keweenaw Co., *Fernald & Pease,* no. 3316.[1] Wisconsin: bluffs on Point Washington, Door Co., June 21, 1891, *Schuette.* Minnesota: Grand Portage, ½ mile southeast of the village, *Rydberg,* no. 9666; talus below calcareous cliff, Grand Portage, *Butters & Buell,* no. 367. Plate 314 and 315, figs. 1, 2 and 5; map 21.

Var. canadensis (Brunet) Fern. & Knowlt. Rhodora, vii. 67, t. 60, fig. 12 (1905). *D. canadensis* Brunet, Cat. Pl. Can. 21 (1865); O. E. Schulz, l. c. 277 (1927), excluding var. *pycnosperma.*—Low, 0.7–1.5 dm. high; siliques elliptic-ovate, 3–8 mm. long, 2–4 mm. broad.—Scattered locally through the range, perhaps better treated as a form. Newfoundland: limestone cliffs and talus, Tucker's Head, Bonne Bay, *Fernald, Long & Fogg,* no. 1749. Quebec: rocher, Bic, *Rousseau,* no. 26,322 (as var. *orthocarpa*); crevices of rocks, St. Joachim, Cap Tourmente, 1864, *Ovide Brunet* (type collection), *Rolland,* no. 15,640. Michigan: Isle Royale, *Cooper,* no. 40, in part (mixed with typical *D. arabisans*); wind-swept sandstone-conglomerate crest of Lookout Mt., Keweenaw Co., *Fernald & Pease,* no. 3317, clearly an extreme of the plant with lanceolate siliques. Plate 315, figs. 3, 4 and 6.

[1] This station, discovered since map 21 was engraved, should be indicated by a dot near Keweenaw Point.

DRABA GLABELLA, var. ORTHOCARPA: FIG. 1, TYPE, × 1, from Bic, Quebec; FIGS. 2 and 3, septum with seeds, and valve, × 10, from TYPE.

Draba arabisans is one of the clearest-cut perennial species of temperate eastern America, and its confusion with others has arisen through inadequate understanding of it or reliance upon mere outlines of siliques rather than upon its more significant characters (sufficiently emphasized in the key and the description above). The tortion of the silique (PLATE 314, FIGS. 2, 3 and 4), which is frequent or usual, may be quite lacking (PLATE 314, FIGS. 1 and 5 and PLATE 315) and similar tortion occurs in many other species. *D. arabisans*, var. *orthocarpa*, as already explained, in the discussion of *D. glabella*, as originally conceived was a mixture, the type-collection (PLATE 309) belonging with *D. glabella*. The remnant left in *D. arabisans* is not worthy special recognition, being merely plants with the siliques little or not at all twisted, a very inconstant character.

Var. *canadensis* (PLATE 315, FIGS. 3, 4 and 6) is, presumably, not a very significant extreme. It seems to be a minor variety with siliques of shorter and broader outline than usual. Its retention as a species by Schulz has been discussed, under *D. pycnosperma;* Schulz very evidently not understanding *D. canadensis* but giving under it a very full and accurate account of the wholly distinct plump-fruited *D. pycnosperma* (PLATE 306). In view of the great range of shape and size of the siliques (PLATES 314, 315), from narrowly lanceolate to elliptic or ovate and either twisted or plane, Schulz's description of them (his p. 275) as "lineari-lanceolatae" is peculiarly inadequate.

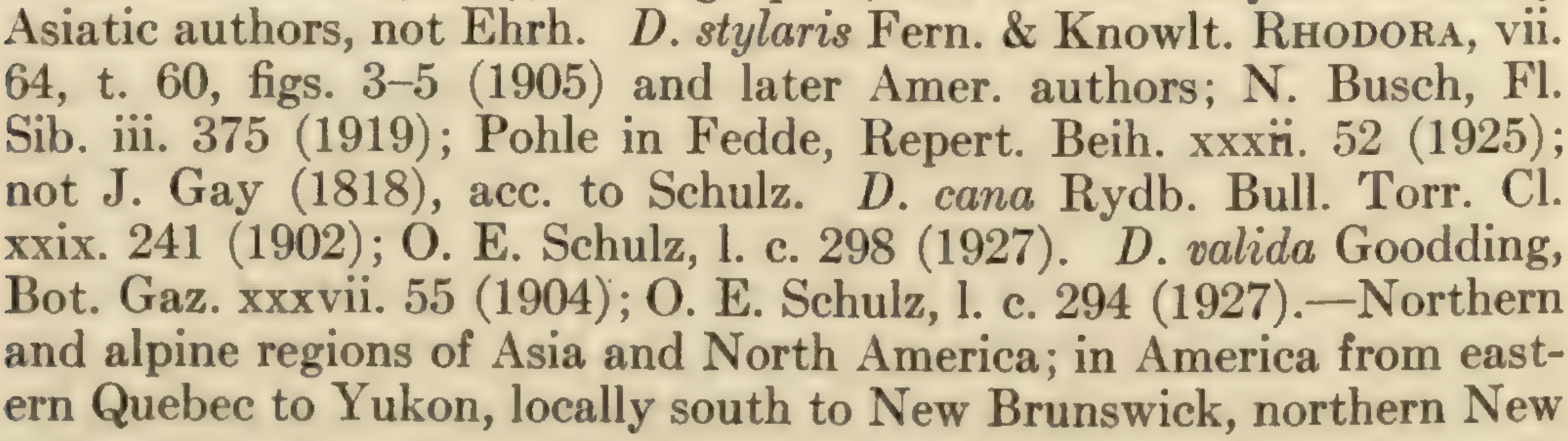
Although the characterization of *Draba arabisans* in *Das Pflanzenreich* assigns the species "Semina minora, vix 1 mm longa," I am unable, in the many hundreds of fruiting specimens now before me, to find well-developed seeds as short as 1 mm.; all good seeds are at least 1.1 mm. long and they range up to a length of 1.7 mm. In fact, flat-fruited *D. arabisans* can quickly be distinguished from *D. glabella* and its var. *orthocarpa*, with which it has been confused, by the seeds alone: in *D. arabisans* 1.1–1.7 mm. long, in *D. glabella* and var. *orthocarpa* 0.7–1 mm. long.

For discussion of Mrs. Ekmans quite untenable opinion that *D. arabisans* is a hybrid of *D. aurea* and *D. glabella* (*D. daurica*) see p. 251.

Ehlers, no. 1103, from limestone rocks, Prentis Bay, Mackinac Co. (Herb. Univ. Mich.), in mature fruit was recorded as *D. aurea* by Walpole, Proc. Mich. Acad. Sci. vi. 313 (1926).

18. D. LANCEOLATA Royle. *Perennial,* with simple to multicipital caudices, forming tufts or mats 0.2–1.5 dm. across; the caudex or its branches retaining many marcescent leaves or their shreds: *rosettes*

1.5–8 cm. across; *their leaves crowded*, oblanceolate or spatulate, entire or remotely dentate, 0.7–4 cm. long, 1–8 mm. broad, *cinereous with dense and soft stellate tomentum:* flowering *stems* 1–30, simple or branching, 0.5–3.5 dm high, *stellate-tomentulose* and very short-pilose: cauline leaves 2–10, lanceolate, oblong or narrowly ovate, entire, denticulate or coarsely dentate, somewhat stellate-tomentulose and often short-pilose, 0.5–3 cm. long: *racemes* dense to lax, *often leafy-bracted at base, in maturity elongating to* $\frac{1}{3}$–$\frac{4}{5}$ *the full height of the plant: pedicels strongly ascending in fruit:* sepals narrowly oblong, pilose, 2–3 mm. long: petals white, obovate, emarginate, 3–5 mm. long: ovary stellate-pilose: *siliques linear-lanceolate to ellipsoid-ovoid, plump, with convex valves*, 4–14 mm. long, 1.5–2.5 mm. broad, *densely stellate-pannose*, twisted or plane; the style very short (up to 0.75 mm. long): seeds 20–48, 0.7–1 mm. long.—Illustr. Bot. Himal. Mts. i. 72 (1839); O. E. Schulz in Engler, Pflanzenr. iv^{105}. 296 (1927). *D. incana* Reichenb. Ic. Pl. Crit. viii. 28, t. 769, fig. 1031 (1830); Gray, Man. ed. 5: 71 (1867), in large part; not L. *D. confusa* of many Asiatic authors, not Ehrh. *D. stylaris* Fern. & Knowlt. Rhodora, vii. 64, t. 60, figs. 3–5 (1905) and later Amer. authors; N. Busch, Fl. Sib. iii. 375 (1919); Pohle in Fedde, Repert. Beih. xxxii. 52 (1925); not J. Gay (1818), acc. to Schulz. *D. cana* Rydb. Bull. Torr. Cl. xxix. 241 (1902); O. E. Schulz, l. c. 298 (1927). *D. valida* Goodding, Bot. Gaz. xxxvii. 55 (1904); O. E. Schulz, l. c. 294 (1927).—Northern and alpine regions of Asia and North America; in America from eastern Quebec to Yukon, locally south to New Brunswick, northern New



Map 22. Eastern American Range of Draba lanceolata.

Hampshire, northern Vermont, Ontario, Michigan, Wisconsin, Colorado and Utah. The following are the eastern American specimens seen. Quebec: lower dry calcareous slaty talus of Mt. St. Pierre, Gaspé Co., *Fernald, Weatherby & Stebbins*, no. 2446; cold and shaded limestone-conglomerate ridge from Pointe aux Corbeaux to Cap Caribou, Bic, *Fernald & Collins*, no. 1077; crevices of dry calcareous rock, Cap Enragé, Bic, *Collins & Fernald*, no. 90; sur le conglomérat nu, au nord du Cap Enragé, Bic, *Rousseau*, no. 26,585; talus of limestone-

conglomerate sea-cliffs, alt. 200–275 m., east of St. Fabien, *Fernald & Collins*, no. 1078 (lax state); exposed crests of limestone sea-cliffs, east of St. Fabien, *Fernald & Collins*, no. 1079. NEW BRUNSWICK: dry rocks, Nashwaak, 1881, *J. Moser* in herb. N. B. Nat. Hist. Soc. NEW HAMPSHIRE: dry cliff, Diamond Peaks, Dartmouth College Grant, *Pease*, no. 20,614. VERMONT: dry cliffs, Willoughby, *Horace Mann, Edw. Tuckerman* and many others; dry alpine cliffs, Smuggler's Notch, Mt. Mansfield, August 2, 1893, *Eggleston*. ONTARIO: limestone boulders, foot of cliffs, Smoky Head, north of Lion's Head, Bruce Co., *Stebbins et al.*, no. 143; limestone ledges near shore of Georgian Bay, north of Dyer's Bay, Bruce Co., *Stebbins et al.* no. 144. MICHIGAN: crevices and talus of limestone cliff, Burnt Bluff, Delta Co., *Fernald & Pease*, no. 3318.[1] WISCONSIN: summit of cliff, Fish Creek, Door Co., *Fassett*, no. 15,566 (lax state). Mostly distributed as *D. incana* or *D. stylaris*. Previously cited specimens from Labrador and Newfoundland were erroneously identified. PLATES 316, 317, 318; MAP 22.

Draba stylaris J. Gay, to which our plant was referred by Knowlton and me when we pointed out its differentiation from the chiefly annual and biennial long-pilose *D. incana*, is, according to Schulz, one of the variants of *D. incana*, confined to continental Europe and the Caucasus. That being admitted it is necessary to seek the next available name for the perennial, matted, canescent plant of Asia and North America.

Although Schulz keeps apart as species *D. lanceolata* Royle (1839) (PLATES 317, FIGS. 1 and 2, and 318, FIG. 2) as strictly Asiatic, and *D. cana* Rydberg (1902) (PLATES 316, 317, FIGS. 3 and 4, and 318, FIG. 1) and *D. valida* Goodding (1904) (PLATE 317, FIG. 5) as strictly North American, I can get no satisfactory distinctions between them. They all show, furthermore, the well known arctic-alpine dispersal on the two continents and it is significant that, although Schulz maintains both *D. cana* (TYPE shown in PLATE 318, FIG. 1) and *D. valida* (TYPE shown in PLATE 317, FIG. 5) as species, Rydberg, who was not averse to maintaining weak species, has regularly united them in his later work. It is also significant that Schulz's description of *D. cana* consists merely of a comparison of it with *D. lanceolata*. The few differences pointed out by him, slight divergences in size of leaves and siliques, do not hold either in the Asiatic specimens before me nor in the larger American series (see PLATES 316–318).

DRABA CINEREA Adams, Mem. Soc. Nat. Mosc. v. 103 (1817) (*D.*

[1] The Michigan station should be added to MAP 22, on the peninsula 1 mm. (on the map) northeast of the Wisconsin station.

arctica J. Vahl, Fl. Dan. xiii. fasc. xxxix. 5, t. 2294 (1840)), has been found on the western side of Hudson Bay, as far south as Cape Henrietta Maria. It is likely to be found on the Labrador Peninsula. From *D. lanceolata* it differs in its few (1–4) remote cauline leaves, its fruiting racemes barely half the height of the plant and borne far above the upper leaf, and the seeds fewer (at most 36).

19. D. RAMOSISSIMA Desv. *Perennial,* forming broad mats (up to 2 or 3 dm. broad); the elongate humifuse branches and branchlets of the caudex covered below with marcescent shreds of old leaves and ending in rosettes 2–10 cm. across: *rosette-leaves* membranaceous, cuneate-oblanceolate, 1–5 cm. long, 2–15 mm. broad, minutely pilose, *with* 1–5 pairs of frequently *horizontally divergent narrow teeth* (sometimes with secondary teeth), or merely low-serrate: *flowering stems* 0.7–4.5 dm. high, *divergently branched above, forming corymbosely paniculate inflorescences*, pubescent with short branching, substellate and simple trichomes intermixed, leafy: cauline leaves 2–24 (rarely almost wanting), lanceolate, oblong, elliptic or ovate, acute, coarsely serrate to deeply pectinate, 0.5–4.5 cm. long, 0.1–2.2 cm. broad: *racemes corymbosely paniculate*, becoming very loose: pedicels filiform, elongate: sepals oblong or narrowly ovate, 2–3.3 mm. long: *petals white* or whitish, narrowly obovate or broadly spatulate, 5–7 *mm. long:* anthers about 0.5 mm. long: ovary pubescent: *siliques long-pedicelled, linear-lanceolate to elliptic-oblong, usually spirally twisted, stellate-pubescent,* 3–11 mm. long, with filiform *style* 1.5–3 *mm. long: seeds* 7–15, 1.2–1.8 *mm. long.*—Journ. de Bot. iii. 186 (1814); DC. Syst. ii. 355 (1821) and Prodr. i. 171 (1824); Torr. & Gray, Fl. N. Am. i. 106 (1838); Watson in Gray, Syn. Fl. N. Am. i[1]. 111 (1895); Britton in Britt. & Brown. Ill. Fl. ii. 142, fig. 1761 (1897); O. E. Schulz in Engler, Pflanzenr. iv[105]. 187 (1927). *D. arabisans* Pursh, Fl. Am. Sept. ii. 434 (1814), as to Virginia plant, not Michx. *Alyssum dentatum* Nutt. Gen. N. Am. Pl. ii. 63 (1818). *D. dentata* (Nutt.) Hook. & Arn. in Hook. Journ. Bot. i. 192 (1834); Hook. Icon. Pl. i. t. xxxi. (1837).—Cliffs and rocks, Virginia, West Virginia, Kentucky, Tennes-

MAP 23. Range of DRABA RAMOSISSIMA.

DRABA GLABELLA, var. BRACHYCARPA: FIG. 1, fruiting stems, × 1, from Greenland; FIG. 2, flowering plant, × 1, from Greenland; FIGS. 3 and 4, silique and septum with seeds, × 10, from fig. 2.

see and North Carolina, highly variable in size and toothing of leaves. The species is so very distinct and of such isolated range (as compared with the other and more northern perennial species) that it is unnecessary to cite the numerous specimens. Those examined come from the following counties. VIRGINIA: Page, Shenandoah, Rockingham, Rockbridge, Roanoke, Giles and Pulaski Cos. WEST VIRGINIA: Jefferson, Hardy, Grant and Pendleton Cos. KENTUCKY: Fayette Co. (and doubtless elsewhere). TENNESSEE: Cocke Co. NORTH CAROLINA: Madison and Buncombe Cos. Well illustrated, as *D. dentata* (Nutt.) Hook. & Arn. in Hook. Icon. Pl. i. t. xxxi (1837). MAP 23.

Draba ramosissima is one of the most distinct species of eastern North America. Although varying greatly in stature, size and depth of toothing of leaves and length of siliques it stands well apart from other American species. Schulz places it, along with *D. aurea, D. aureola* and other species with orange or yellow petals in his section *Phyllodraba* and includes it in his key under the call: "I. Flores flavi" (pp. 173, 174), though in the fuller description (p. 187) he slightly reduces the shock by saying "Petala dilute flava." The petals, according to those who have collected the plant, are the white of those of *D. arabisans, D. incana, D. glabella* and the others of Schulz's section *Leucodraba* ("Flowers white"—Torr. & Gray, Fl. No. Am. i. 106; "flowers white"—Gray, Man. ed. 2: 36; "flowers white"—Britton in Britt. & Brown, Ill. Fl. ii. 142; "petals white"—Small, Fl. Se. U. S. 480). So white are the petals that when Pursh (Fl. Am. Sept. 434) "collected specimens on the rocks near Harper's Ferry" (very possibly the type-station of *D. ramosissima*) he mistook it for the white-flowered *D. arabisans* Michx.

20. D. APRICA Beadle. *Annual* or winter-annual: stems 0.5–3.5 dm. high, simple below or loosely branched and stellate-puberulent; rarely with elongate branches above, but *with abbreviated or subsessile short corymbs in the middle and upper axils:* lower leaves obovate to rhombic-oval, coarsely

MAP 24. Range of DRABA APRICA.

2–4-dentate, thin, petioled, 0.7–2 cm. long, minutely strigose-hirtellous with irregularly stellate trichomes; cauline leaves remote, up to 17 in number, sessile, narrowly obovate to narrowly oblong or the upper linear-lanceolate, 0.5–2 cm. long, entire or sparsely dentate: *flowers apparently hermaphrodite, some apetalous, others petaliferous:* pedicels stellate-puberulent: sepals narrowly oblong, 0.8–1 mm. long: *petals,* when present, white, *spatulate,* 2.5–3 mm. long (acc. to Beadle): *siliques linear-ellipsoid,* 4–6 *mm. long, minutely stellate-puberulent,* tipped by a minute slender style: *seeds* 6, oblong-oval, 1–1.5 *mm. long.*—Beadle in Small, Fl. Se. U. S. ed. 2, Append. 1336 (1913); O. E. Schulz in Engler, Pflanzenr. iv[105]. 339 (1927).—Georgia: "common" on Kenesaw Mt., near Marietta, May 9, 1901, Biltmore Herb. (type, Herb. N. Y. Bot. Gard.); dry, open northern and northeastern slope, near the top, Kenesaw Mt., May 5 and 12, 1934, *L. M. Perry & M. C. Myers,* nos. 750, 751. Plate 319, figs. 8–10; map 24.

Draba aprica is little known. Until its rediscovery by Dr. Perry and Mr. Myers in the spring of 1934, the only material I had seen was the type sheet, which contains three fruiting specimens, two of them with the stems simple except for the abbreviated upper branches (fig. 8), the third a taller plant which might well have been 3.5 dm. high (the terminal raceme broken off) and bearing a few elongating axillary racemes, apparently a response to the breaking off of the top. The original label states that it is "common"; b t Dr. Perry's experience indicates that, in 1934 at least, it is not abundant. I q··ote from her letter of May 28, 1934.

> On May 5th I took the train [from Athens, Georgia] for Marietta, was joined by Mr. Myers, a former student of mine, and we proceeded to Mount Kenesaw. It is a rugged and rough hill in two parts. We were able to cover but one part that day between trains, and I must own that I was somewhat discouraged. We were almost to the top of the northeast slope before Mr. Myers, who was some ten feet ahead of me, stopped and said, "here it is, Dr. Perry," and handed me a specimen. We had been made so confident by the "common" on the label which you described that I couldn't understand what was the matter with my eyes. There were ten to fifteen plants in that spot. We found one other spot and that is all. The mountain is pretty open on top but I believe it had been burned over either early this spring or very late last fall. Anyhow, a job half done isn't done at all, and to convince you that I was painstaking about it, on my own I hired a car the next Saturday and that day we covered the other part of the mountain, somewhat more leisurely as we had no train to make. In all we probably found 50 *good* specimens, so I can assure you that the little *Draba* is very rare, this season at any rate.

Dr. Perry further informs me that *Draba aprica* is closely associated with *Viola Rafinesquii* Greene and *Oxalis violacea* L.

Schulz suggested that *Draba aprica* is to be compared with *D.*

brachycarpa Nutt., var. *fastigiata* Nutt. in Torr. & Gray, Fl. N. Am. i. 108 (1838) and he published the needless binomial "Nuttall 1825 als *Draba fastigiata* msc. in hb. Delessert!"—Schulz, l. c. 339 (1927). *D. brachycarpa,* var. *fastigiata* was separated from typical *D. brachycarpa* as "more pubescent; stem mostly simple; radical leaves mostly 4-toothed; silicles pubescent."

Whether *Draba aprica* should include *D. brachycarpa* var. *fastigiata* is at present not wholly clear. The type sheet of *D. brachycarpa* from the Torrey Herbarium is before me. It consists of the original Nuttall material from Arkansas, four plants at the top of the sheet; and at the bottom the plants from Millidgeville, Georgia, *Boykin,* and from Macon, Georgia, *Loomis,* originally cited for *D. brachycarpa,* and a third and different specimen without designation of locality but presumably from near St. Louis, Missouri, the fourth locality given by Torrey & Gray. The four specimens of the original Nuttall collection from Arkansas are two branching plants which must stand as the type of Nuttall's species and which are thoroughly typical of that species as understood. Alternating with them on the sheet are two unbranched individuals, one with the raceme gone, the other (FIG. 11) with a compact terminal raceme of a few stellate-pubescent oblanceolate siliques (FIG. 12). The two simple specimens are marked in Nuttall's hand *D. fastigiata* and must stand as the type of *D. brachycarpa,* var. *fastigiata.* In view of the fact that the larger specimen of the two has lost its raceme, I refrain from opening one of the immature siliques of the remaining individual. The seeds of this plant, if mature, would quickly settle whether it is a very unusual variation of *D. brachycarpa* (PLATE 319, FIGS. 1–7), which otherwise has oblong and glabrous siliques, or a very dwarf and atypical representative of the highly localized *D. aprica.* The collections in the Gray Herbarium and at the New York Botanical Garden show no *D. brachycarpa* with pubescent siliques; and, in view of the presence on Nuttall's sheet of specimens of typical *D. brachycarpa* from two Georgia stations, it is not impossible that the two plants of var. *fastigiata* came, not from Arkansas, as supposed, but from Kenesaw Mt. in Georgia, which is easily reached from Atlanta. Students of the Arkansas flora should watch for and, if possible, collect material to settle this dilemma.

21. D. BRACHYCARPA Nutt. *Annual or biennial* (forming rosettes the first year): *stems simple or more commonly bushy-branched* either from the base or from the upper axils, stellate-hirtellous or -strigose,

0.4–2 dm. high: basal leaves elliptic, oval or obovate, petioled, 0.5–2 cm. long, stellate-pubescent; cauline leaves 3–12, smaller and narrower, sessile, the upper nearly linear: *racemes* at first dense, *in fruit becoming lax* and up to 7.5 cm. long: pedicels spreading-ascending, glabrous to stellate-hirtellous, the lower becoming 1–5 mm. long: *flowers dimorphic or trimorphic*,[1] the smaller apetalous, others with small narrow petals, others with conspicuous white petals: sepals oblong to ovate (in larger flowers), 1–1.5 mm. long, glabrous or sparsely pilose: *larger petals obovate*, 2–3 mm. long: *pistils glabrous, with* 10–16 *ovules: siliques oblong-ellipsoid*, 1.7–5 *mm. long, glabrous: seeds* 0.5–0.8 *mm. long*.—Nutt. in Torr. & Gray, Fl. N. Am. i. 108 (1838); Darby, Man. Bot. ii. 24 (1841); Gray, Man. ed. 2: 37 (1856); Chapm. Fl. So. U. S. 29 (1860); Watson in Gray, Syn. Fl. N. Am. i.[1] 107 (1895); Britton in Britton & Brown, Ill. Fl. ii. 143, fig. 1762 (1897); Small, Fl. Se. U. S. 480 (1913); O. E. Schulz in Engler, Pflanzenr. iv[105]. 338, fig. 32 (1927). ?*Discovium gracile* Raf. Journ. de Phys. lxxxix. 96 (1819). ?*Discovium Ohiotense* DC. Syst. ii. 700 (1821). *Alyssum bidentatum* Nutt. ex Torr. & Gray, l. c. (1838) as syn. *Abdra brachycarpa* (Nutt.) Greene,

[1] "This humble white flower is at this season very abundant on the grassy hills about town, associated with *Draba Caroliniana*, the pretty *Houstonia minima*, with *Androsace occidentalis*, *Plantago pusilla*, *Ranunculus fascicularis*, *Myosurus minimus*, and the completely naturalized *Capsella*. In ordinary or in wet springs the flowers are all regularly formed and comparatively large, having a diameter of about 2 lines; in very dry springs, however, such as the present one, a form with very inconspicuous flowers becomes common, which in isolated specimens in the herbarium might be taken for a distinct species, but, studied on its native hills in thousands of specimens, clearly proves to be nothing but a depauperate or abortive state and not even a clearly defined variety.

During a late excursion to our commons in company with Dr. Hilgard, he ascertained that on the northern slopes of hills and sinkholes, and near the edge of ponds, the plant had the ordinary appearance, but on the sunny and dry or even arid southern slopes not a single one among the thousands of specimens could be found the flowers of which were not quite inconspicuous; in intermediate situations the size and organization of the flowers were also intermediate.

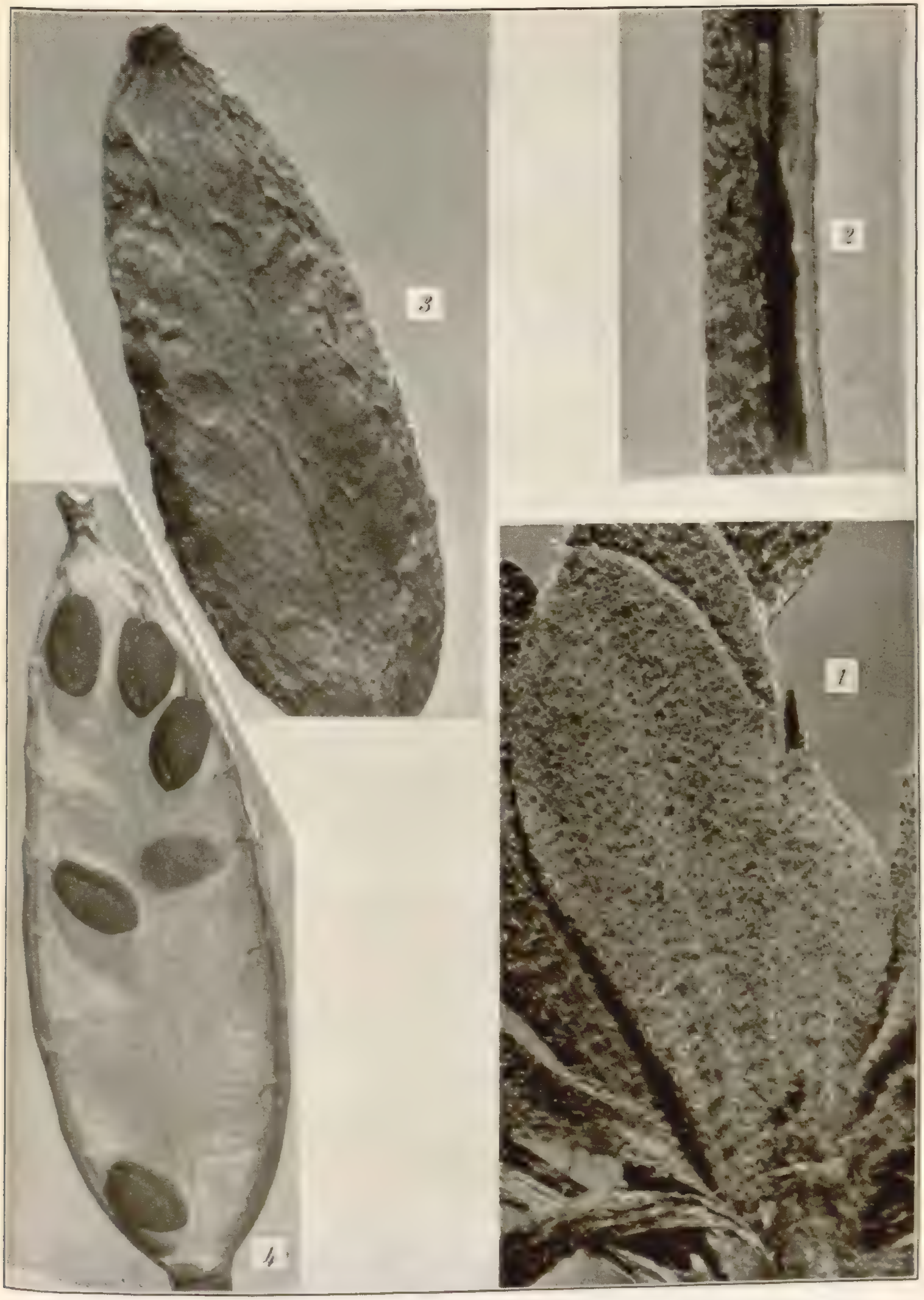
These incomplete flowers are smaller in all their parts than the regular ones; the sepals are erect and rather persistent; the petals always shorter than the sepals, but variable in size, shape, and number, or even entirely absent; the stamens always abortive and often reduced in number; the ovary shorter but fertile.

The petals ordinarily broadly obovate-spatulate, retuse, over 1 line long, are here linear-spatulate, entire, emarginate or bilobed, 1/6–1/3 line long, 2 or 4 in a flower, often of unequal size in the same flower, or entirely absent. The slender filaments bear a bilobed cellular head, often not more than 0.05 line long, representing the anther, but without any regular structure. He found in single flowers 4, and often 5 or 6 of them, without petals, or associated with 2 or 4 rudimentary petals. It appears that in some incomplete tetrandrous flowers the pairs of stamens adhere to the base of the corresponding exterior, and the pairs of petals to that of the interior sepals; the 8 organs forming rather one than two cycles.

How these female plants, as they must be called, which, this spring at least, form the immeasurably largest part of the whole crop, can be fertilized by the few complete ones growing in the neighborhood, is not easy to understand.

Does not this dimorphism obtain in other species of this genus, in *Lepidium* and other *Cruciferae*, and would not several so-called species fall, if correctly understood, under other fully developed ones as incomplete forms?"—Engelm. Trans. Acad. Sci. St. Louis, ii. 154 (1862).

DRABA GLABELLA, var. MEGASPERMA: FIG. 1, portion of flowering plant, from Archipel Ouapitagone, Quebec; FIG. 2, portion of fruiting plant, × 1, from Archipel de Mingan, Quebec; FIG. 3, portion of fruiting plant, × 1, from Forteau, Labrador; all × 1.



DRABA GLABELLA, var. MEGASPERMA, details from the TYPE, × 10, from Paspébiac, Quebec: FIG. 1, rosette-leaves; FIG. 2, portion (fractured, overripe) of lowest internode; FIGS. 3 and 4, valve, and septum with seeds.

Pittonia, iv. 207 (1900). *D. brachyc.*, vars. *apetala* and *grandiflora* Engelm. ex O. E. Schulz, l. c. 339 (1927) as syns. *D. bidentata* Nutt. ex O. E. Schulz, l. c. 339 (1927) as syn.—Dry to moist open soil and waste ground, northern Florida to Texas, north to Virginia, southern Ohio (?), Indiana, Illinois, Missouri and Kansas; also (adventive?) in Oregon. Flowers late winter and early spring. PLATE 319, FIGS. 1–7.

For discussion of the problematical *Draba brachycarpa*, var. *fastigiata* see notes under *D. aprica*.

Draba brachycarpa is inclined to be a weed of roadsides and waste places and its present northern limits have doubtless been extended beyond its primitive range.

There are two names earlier than *Draba brachycarpa* (1838) which need explanation. Here possibly belongs *Discovium gracile* Raf. (1819), "Trouvé en juin sur les rives de l'Ohio, près de Gallipolis." Rafinesque's description, save for "Fleurs jaune" (an error independently committed by some later authors) and for the month June, which is rather late, strongly suggests that he had *Draba brachycarpa*, although I know of no evidence of the species now being found in Ohio (it is in Tennessee, Indiana and Illinois). I have seen none of Rafinesque's material but it is apparently preserved in the De-Candolle herbarium at Geneva. Should it prove, as I surmise, to be *Draba brachycarpa*, *Discovium gracile* (1819) cannot displace the name *Draba brachycarpa* (1838) because of *Draba gracilis* Graham (1828). A complicating situation arises through the fact that De-Candolle in 1821 called Rafinesque's species *Discovium Ohiotense*, without citing *Discov. gracile* as a synonym. Consequently, it might plausily be urged that De Candolle's specific epithet should be used (when and if the species proves to be *Draba brachycarpa*). It should be noted, however, that DeCandolle exactly translated Rafinesque's French diagnosis of *Discov. gracile* into Latin and added nothing to it, even citing the identical habitat: "Ad ripas fluminis Ohio prope Gallipoli." It should be evident, therefore, that, although he did not mention *Discov. gracile* Raf. as the basis of his *Discov. Ohiotense*, DeCandolle was, in fact, publishing a needless new name for it. As an illegitimate name, *Discov. Ohiotense* cannot be taken up to displace the legitimate *Draba brachycarpa*, even though it antedates it by seventeen years.

22. D. NEMOROSA L. *Annual or winter-annual* 0.5–3 dm. high, *simple or with few ascending branches: stem hispid* with simple, bifurcate and stellate trichomes variously intermixed: *rosette-leaves*

oblong-obovate or elliptical, obtuse, with pubescence as on the stem, subentire or remotely dentate: *cauline leaves* 0–7 *on the primary axis,* 1–5 *on the branches,* oblong to ovate, acute, with 2–6 pairs of teeth: *raceme* corymbiform in anthesis, *becoming elongate and very lax and up to nearly the full height of the plant:* sepals 1.5 mm. long, oblong or narrowly ovate, obtuse: *petals pale yellow, becoming white, narrowly cuneate, about* 2 *mm. long: fruiting pedicels widely spreading* to subascending, often arching, filiform, 0.7–2(–2.5) *cm. long: siliques narrowly oblong,* 3–13 *mm. long, minutely strigulose-hispid:* seeds 30–50.—Sp. Pl. 643 (1753); Gray, Man. ed. 2: 37 (1856); Wats. in Gray, Syn. Fl. N. Am. i[1]. 107 (1895); Britton in Britt. & Brown, Ill. Fl. ii. 143, fig. 1763 (1897); O. E. Schulz in Engler, Pflanzenr. iv[105]. 309 (1927), which see for detailed citations; Rydb. Fl. Prair. Pl. Centr. N. Am. 379, fig. 252 (1932). *D. muralis,* β. L. Fl. Suec. ed. 2: 224 (1755). *D. nemoralis* Ehrh. Beitr. vii. 154 (1792); Hook. Fl. Bor.-Am. i. 55 (1830); Torr. & Gr. Fl. N. Am. i. 108 (1838); Gray, Man. 39, (1848). *D. nemorosa,* β. *hebecarpa* Lindbl. Linnaea, xiii. 333 (1839). *D. nemoralis,* α. *genuina* Boiss. Fl. Orient. i. 303 (1867). *D. nemorosa,* α. *typica* Beck von Man. Fl. Nied.-Öst. 472 (1892). *D. nemoralis,* var. *hebecarpa* (Lindbl.) Lehm. Fl. Poln.-Liv. 315 (1895). *Crucifera nemorosa* (L.) E.H.K. Krause in Sturm, Fl. Deutschl. ed. 2, vi. 61 (1902). *D. nemorosa,* var. *genuina* N. Busch in Kusnezow, Busch & Fomin, Fl. Cauc. Crit. iii[4]. 406 (1909), ascribed to Boiss. l. c.—Dry open soils through much of western North America, from northern British Columbia to Nevada and Utah, east to Manitoba and South Dakota, very locally to western Ontario and Michigan; Eurasia.

The plants with siliques only 3–6 mm. long have been called

Forma BREVISILIQUA (Zapalowicz) N. Busch, Fl. Sib. iii. 389 (1919). Var. *brevisiliqua* Zapalowicz, Consp. Fl. Galic. Crit. xxv. in Rozpr. Wydz. Mathem.—Przyr. Akad. Umiej. ser. 3, xiiB, 238 (1912), acc. to Schulz, l. c. 313.

The plants with large siliques (9–13 mm. long, 2–2.5 mm. broad) have been called

Forma MACROLOBA Pohle in Fedde, Repert. Beih. xxxii. 3 (1925).

Var. LEJOCARPA Lindbl.—*Siliques glabrous.*—*D. lutea* Gilib. Fl. Lith. ii. 46 (1781); DC. Syst. ii. 351 (1821) and Prodr. i. 171 (1824); Hook. Fl. Bor.-Am. i. 55 (1830); Rydb. Fl. Rky. Mts. 352 (1917) and later works. *D. muralis,* b. *Draba intermedia* H. de Martius, Fl. Mosq. 111. (1812). *D. gracilis* Graham, Edinb. New Phil. Journ. iv–ix. 172 (1828). *D. nemorosa,* α. *lejocarpa* Lindbl. Linnaea, xiii. 333 (1839); O. E. Schulz, l. c. 314 (1927), which see for much further bibliography. *D. nemoralis,* β. *glabra* Fleischer & Lindem. Fl. Esth.-Liv.-u. Kurland, 230 (1839). *D. nemorosa,* var. *lutea* (Gilib.) Fries, Summ. Veg. Scand. i. 31 (1846). *D. nemorosa,* a. *glabra* (Fleisch. & Lindem.) Schur, Enum. Pl. Transsilv. 66 (1866). *D. nemoralis,* β. *lejocarpa* (Lindbl.) Boiss. Fl. Orient. i. 303 (1867). *D. dictyota*

Greene, Pittonia, iv. 313 (1901).—Alaska to Colorado, eastward to Hudson Bay (Churchill, *J. M. Macoun*, no. 79,070) and Lake Superior,[1] Ontario and Minnesota; locally introduced eastward to QUEBEC: "Apparement naturalisé de l'Ouest," Lac Deschenes, 26 mai 1923, Herb. Univ. Montr. no. 17,416. Eurasia.

23. D. CUNEIFOLIA Nutt. Annual or winter annual (forming rosettes the first year, flowering and fruiting in earliest spring): *stem simple or branching from near the base*, in anthesis 0.2–1.5 dm. high, in fruit elongating to 0.5–2.8 dm. high, *hispid from base to summit* with simple, bifurcate and minute stellate hairs; *leaves basal and at the lower nodes and at bases of the* arched-ascending *branches*, cuneate-obovate, obtuse, mostly 1–3 cm. long, *coarsely dentate*, *hispid* with stipitate and sessile forking trichomes: raceme in anthesis corymbiform, *elongating* in fruit *to a lax raceme* $\frac{1}{3}$–$\frac{1}{2}$ *the height of the plant: flowers dimorphic or trimorphic*, those of the primary raceme large and showy, of the lateral ones either large or with minute petals or apetalous, or all of them minute:[2] sepals of the larger flowers 1.8–2.5 mm. long, oblong, obtuse, the outer hispid; of the small flowers 1–1.6 mm. long, hispid: larger petals white, elliptic to broadly spatulate, 3–5 mm. long: anthers of the larger flowers 0.2–0.4 mm. long, of the smallest minute or wanting: *fruiting pedicels pubescent*, *horizontally divergent* or upwardly arching, 3–8 *mm. long:* siliques broadly linear to narrowly oblong, compressed, obtuse to subacute, without apparent style, 6–16 mm. long, 1.6–2.5 mm. broad, strigose-setulose, with 20–48 seeds.—Nutt. in Torr. & Gray, Fl. No. Am. i. 108 (1838); Wats. Bibl. Ind. i. 59 (1878), many references, and in Gray, Syn. Fl. N. Am. 1^1. 107 (1895); Britton in Britt. & Brown, Ill. Fl. ii. 141, fig. 1757 (1897); Rob. & Fern. in Gray, Man. ed. 7: 422, fig. 777 (1908); O. E. Schulz in Engler, Pflanzenr. iv^{105}. 333 (1927). *D. filicaulis* Scheele, Linnaea, xxi. 583 (1848).—Dry rocky or sandy soil, barrens and open woods, Florida to Texas and northern Mexico, north to Kentucky, southern Illinois, Missouri, Kansas and Colorado.

West of our range passing into

Var. LEIOCARPA O. E. Schulz, l. c. 334 (1927).—Siliques glabrous.—Arkansas and Louisiana to Arizona.

Var. HELLERI (Small) O. E. Schulz.—Siliques ellipsoid-oblong, strigose, 4–8.5 mm. long, on pedicels only 1–3 mm. long: seeds fewer.—O. E. Schulz, l. c. (1927). *D. Helleri* Small, Fl. Se. U. S. 479 (1903). *D. ammophila* Heller, Muhlenbergia, i. 145 (1906).—Texas to southern California, locally north to Washington.

[1] In Agassiz, Lake Superior, 155 (1850), after listing *Draba arabisans*, Agassiz made the note: "A small species of Draba with yellow flowers, found at Michipicotin, was lost." This was undoubtedly *D. nemorosa*, var. *lejocarpa*, for the National Herbarium at Ottawa has a characteristic sheet of the latter: dry sand hills and banks, Michipicotin, July 27th, 1869, *John Macoun*, the number juggled in a misleading way. "No. (447. 178) 2014."

[2] See quotation from Engelmann under discussion of *D. brachycarpa*.

24. D. **reptans** (Lam.), comb. nov. Annual or winter-annual: *stems* filiform, *simple or* slightly to freely *branching at base,* the larger plants with depressed or diffuse branches, 0.2–1.5 dm. high, *hispid below* with simple, forking and sessile stellate hairs, *glabrous above and on the rachis: leaves in a basal rosette and* 1 or 2 pairs or groups of 3 *crowded above it or at the base of the otherwise scapiform branches,* spatulate-obovate, rounded at summit, *entire or nearly so, bristly-ciliate,* the upper surface coarsely bristly with long simple trichomes and often stellate, *the lower surface with stellate and forking hairs: raceme in fruit short and subumbelliform, its axis* 0.3–4 cm. long, *glabrous: flowers dimorphic;* the larger with oblong sepals about 2 mm. long and obovate white petals 3–5 mm. long; the smaller with narrowly oblanceolate petals equaling or shorter than the narrow sepals or wanting: *fruiting pedicels divergent or arched-ascending,* 1–7 mm. long, *glabrous: siliques* linear to narrowly oblong, obtuse, 0.5–2.2 cm. long, *glabrous:* seeds 15–60 (–80).—*Arabis reptans* Lam. Encycl. i. 222 (1783); Willd. Sp. Pl. iii[1]. 536 (1800); DC. Syst. ii. 242 (1821); Torr. & Gray, Fl. No. Am. i. 83 (1838). *D. caroliniana* Walt. Fl. Carol. 174 (1788); Willd. Sp. iii[1]. 427 (1800); Nutt. Gen. N. Am. Pl. ii. 62 (1818); DC. Syst. ii. 353 (1821) and Prodr. i. 171 (1824); and essentially all later authors, including O. E. Schulz in Engler, Pflanzenr. iv[105]. 331, fig. 31 (1927). *D. hispidula* Michx. Fl. Bor.-Am. ii. 28 (1803). *D. umbellata* Muhl. Cat. 60 (1813), renaming of *D. caroliniana* Walt. *Arabis rotundifolia* Raf. Am. Mo. Mag. ii. 43 (1817). *Tomostima caroliniana* (Walt.) Raf. Neogenyton, 2 (1825). *T. hispidula* (Michx.) Raf. l. c. (1825). *D. caroliniana,* β. *umbellata* Torr. & Gray, Fl. N. Am. i. 109 (1838), the longest-fruited extreme = *D. caroliniana,* var. *dolichocarpa* O. E. Schulz, l. c. 333 (1927).—Dry sands and ledges, Georgia to New Mexico, north to eastern Massachusetts. Rhode Island, Connecticut, southeastern and northern (Sackett's Harbor, *Vasey* in Gray Herb.) New York, eastern Pennsylvania, southern Ontario, Michigan, Wisconsin, Minnesota, North Dakota and Colorado; also locally, Washington and Oregon.

Var. **micrantha** (Nutt.), comb. nov. Siliques minutely hispid.—*D. micrantha* Nutt. in Torr. & Gray, Fl. N. Am. i. 109 (1838); Gray, Man. ed. 2: 37 (1856); Small, Fl. Se. U. S. 479 (1903); Rydb. Fl. Rky. Mts. 352 (1917). *D. caroliniana,* var. *micrantha* (Nutt.) Gray, Man. ed. 5: 72 (1867); Wats. in Gray, Syn. Fl. N. Am. i[1]. 106 (1895); Britton in Britt. & Brown, Ill. Fl. ii. 141 (1897); O. E. Schulz, l. c. 333 (1927). *D. coloradoensis* Rydb. Bull. Torr. Bot. Cl. xxxi. 555 (1904).—Chiefly western, Louisiana to southern California, north to Illinois, Minnesota, South Dakota, Montana and Washington.

The necessity to change the specific epithet arises through the fact that earlier authors, some of them cognizant of the properly published *Arabis reptans* Lam., have failed to apply the priority principle, which it is often a temptation to overlook! Willdenow, DeCandolle

DRABA MCCALLAE: FIG. 1, flowering plant (TYPE), × ½, from Alberta; FIG. 2, fruiting stem, × ½, from Alberta; FIG. 3, rosette-leaves, × 10, from Alberta; FIG. 4, lower internode, × 10, from Alberta; FIG. 5, flower, × 10, from TYPE; FIG. 6, silique, × 10, from fig. 2.

and others in Europe, unfamiliar with American plants, accepted *A. reptans* at its face value as an Arabis; and even Pursh, who should have known better, kept it up as *A. reptans* from "sandy fields: Pennsylvania to Virginia" (Pursh, Fl. Am. Sept. 437) and on another page (433) maintained *Draba hispidula* Michx. (with the earlier *D. caroliniana* Walt. as a synonym), apparently without suspecting the identity. The recognition of the probable identity apparently started with Torrey & Gray, who relegated *A. reptans* to the doubtful species, with the pertinent query: "Is it Draba Caroliniana?" In his Bibliographic Index (1878) Watson entered *A. reptans* doubtfully in the synonymy of *D. caroliniana*, but in the Synoptical Flora the doubt was unexpressed; and Schulz gives this name of 1783 unequivocally in the synonymy of *D. caroliniana* (1788).

Draba reptans rests upon *Arabis reptans* Lam. which was based solely on *Paronychia Myosotis Virginiana, foliis subrotundis* of Plukenet, Phytogr. t. li. fig. 5 (1691) and Almag. 281 (1699). Plukenet's figure, like so many of his drawings of American plants, is very definite to one who knows the flora. It is here reproduced as TEXT-FIG. 1; and it is well matched by many specimens from eastern America, while Lamarck's description of it is unequivocal.

FIG. 1. Type of DRABA REPTANS, after *Plukenet*.

The maintenance by some authors of *D. micrantha* or *D. coloradoensis* as a species merely because it has hispid, instead of glabrous siliques, seem unjustified. Similar variations without other characters occur in many species: for example, *D. nemorosa* (typical) with siliques strigose-hispid, var. *lejocarpa* (*D. lutea*) with them glabrous; *D. cuneifolia* with strigose-hispid siliques, var. *leiocarpa* with them glabrous, etc., etc.

25. D. VERNA L. *Small annual or winter-annual,* flowering chiefly in early spring: *leaves all in a basal rosette,* oblanceolate or spatulate, entire or dentate, more or less pilose on the upper surface with simple, bifurcate and stellate trichomes, 0.5–2.5 cm. long: *scapes* 1–several and very unequal, *filiform,* in fruit elongating to 0.3–3 dm. high, glabrous or nearly so: *raceme* at first corymbiform, *in fruit becoming elongate and lax, the lower pedicels then* 0.4–3 *cm. long,* ascending: sepals ovate to obovate, with rounded tips, 1–2 mm. long, glabrous or hispid on the back: *petals* white, *bifid half their length,* 1.5–2.5 mm. long: *siliques narrowly oblong-elliptic,* 4–10 mm. long, 1.5–2.3 mm. broad, glabrous, with 40–60 seeds.—Sp. Pl. 642 (1753); Pursh, Fl. Am. Sept. 433 (1814); Barton, Fl. N. Am. iii. 49, t. 88 (1823); Torr. & Gray, Fl. N. Am. i. 109 (1838); Watson in Gray, Syn. Fl. N. Am. i.[1] 106 (1895). *Erophila vulgaris* DC. Syst. ii. 356 (1821). *E. verna* (L.) E. Meyer in Preuss, Pflanzengatt. 179 (1839); O. E. Schulz in Engler. Pflanzenr. iv[105]. 345 (1927), which see for very detailed bibliography.—Roadsides, fields and other open, dry habitats, Massachusetts to Ohio, Kentucky, Tennessee and North Carolina; southern British Columbia to California. Naturalized from Europe. Much less frequent than

Var. AESTIVALIS Lejeune.—*Siliques broadly elliptic, elliptic-obovate or rounded,* 2.5–6 mm. long, 2–4 mm. broad; seeds fewer.—Rev. Fl. Env. Spa, 128 (1824); Wildem. & Dur. Prodr. Fl. Belg. iii. 346 (1899). *D. Boerhaavii* Van Hall, Specim. Bot. 149 (1821). *D. verna* Bigel. Fl. Bost. ed. 2: 250 (1824); Gray, Gen. i. 160, t. 69 (1848); Britton in Britt. & Brown, Ill. Fl. ii. 140, fig. 1755 (1897). *Erophila Boerhaavii* (Van Hall) Dumortier, Fl. Belg. 120 (1827); O. E. Schulz, l. c. (1927), which see for many synonyms and references.—More frequent, Massachusetts to southern Ontario, south to Georgia and Tennessee; Washington and Oregon. Naturalized from Europe.

Var. *aestivalis* is treated as a species, *Erophila Boerhaavii,* by Schulz, distinguished in his key from *E. verna* by "Siliculae abbreviatae, breviter obovoideae vel subrotundatae. Ovarium 24–48-ovulatum" as opposed to the "Siliculae oblanceolate" and "Ovarium 44–60-ovulatum" of *E. verna.* But in the detailed descriptions the "oblanceolate" siliques of *E. verna* become "oblongo-ellipsoideae," while *E. verna,* var. *oedocarpa* (E. Drabble) O. E. Schulz has them "anguste obovato-lanceolatae," var. *cochleata* (Rosen) O. E. Schulz has them "ovoideae, subtumideae," and var. *Charbonnelii* (H. Sudre) O. E. Schulz has them "6 mm longae, 2,5–3 mm latae," proportions most difficult to reconstruct into "*oblanceolate.*" Incidentally, the key-character of *E. Boerhaavii,* "Ovarium 24–48-ovulatum," changes in the fuller description to "Ovarium ovulis 32—18."

I have, consequently, taken up, with full appreciation of the possible doubt involved, the name *Draba verna*, var. *aestivalis* Lejeune. In an Old World group wherein some authors have seen nearly 200 "species" while others (Rouy & Foucaud, for example) see in France alone 8 subspecies with 57 recognized varieties and forms it is not safe to be dogmatic. Lejeune's brief description is satisfactory:

Var. aestivalis N. siliculis ovatis, convexis, pedicello brevioribus; foliis sublinearibus.

Obs. La première variété . . . , la deuxième [var. *aestivalis*] se distingue par la forme de ses fruits qui sont beaucoup plus courts et à valves bombées, ce qui leur donne une forme plus arrondie.

Schulz cites *Draba verna*, var. *aestivalis* (1824) as an unquestioned synonym of his *Erophila Boerhaavii*, but he also gives, as his basis of *E. Boerhaavii* the earlier "*Draba verna* L. β. *Boerhaavii* Van Hall, Specim. bot. (1821) 149." I have not seen Van Hall's account, but it is significant that in quoting it (his footnote, p. 359) Schulz makes it clearly appear that Van Hall was publishing a binomial, *D. Boerhaavii:*

A *Draba verna vulgari* valde differt siliculis duplo latioribus et brevioribus, statura longe minori. Nonne haec insignis formae siliculae differentia satis magni momenti est habenda, ut tamquam s p e c i e s, nomine *Drabae Boerhaavii*, a *D. verna* distinguatur? (H a l l l. c.).

Index Kewensis, likewise, gives *Draba Boerhaavii* Van Hall unequivocally as a binomial.

Another set of synonyms usually cited under *Draba verna* rests for typification directly upon *D. verna*, β. *americana* Pers. Syn. ii. 190 (1807). These are *Erophila americana* (Pers.) DC. Syst. ii. 356 (1821); *E. vulgaris*, var. *americana* (Pers.) Darl. Fl. Cestr. 378 (1837) and *D. americana* (Pers.) Hook. f. & Jackson, Ind. Kew. ii. 792 (1893). The pedicels of *D. verna* are ordinarily strongly ascending or but slightly arching; but the brief description given by Persoon under *D. verna* was

β. *americana*, silicul. longioribus deflexis. Hab. in Europae et Americae aridis,

a wholly unconvincing account of a plant with ascending fruit! Later authors doubtless had forms of *D. verna* before them but it is doubtful if Persoon did. *Erophila verna*, var. *americana* (Pers.) O. E. Schulz, l. c. 355 (1927) is kept up by Schulz for a plant of Europe and of "Arkansas (R a f i n e s q u e, hb. Deless.)" but he says nothing about the siliques being "deflexed."

(*To be continued*)

DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. FERNALD

(*Concluded from page 371*)

LIST OF EXSICCATAE CITED

Abbe, E. C.

371 glabella Pursh
372 nivalis Liljebl.
374 crassifolia Graham
375 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
376 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
377 nivalis Liljebl.
378 nivalis Liljebl.
379 fladnizensis Wulfen, var., heterotricha (Lindbl.) Ball
380 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
381 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
383 nivalis Liljebl.
384 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
385 rupestris R. Br.
386 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
387 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
1261 glabella Pursh, var. megasperma (Fernald & Knowlt.) Fernald
1262 norvegica Gunner

Abee & Brooks

364 glabella Pursh
365 glabella Pursh
366 norvegica Gunner
367 glabella Pursh
368 norvegica Gunner

Abbe & Hogg

369 nivalis Liljebl.

Abbe, Hogg & Forbes

370 incana L., var. confusa (Ehrh.) Liljebl.

DRABA ARABISANS: FIG. 1, portion of flowering branch, × 1, from Ontario; FIG. 2, fruiting branch, × 1, from type region, Lake Champlain, Vermont; FIG. 3, fruiting branch, × 1, from Quebec; FIG. 4, fruiting raceme, × 1, from type region, Lake Champlain; FIG. 5, silique, × 10, from type region; FIG. 6, small rosette-leaf, × 10, from Newfoundland.

Abbe & Odell

373 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
382 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball

Abbe & Pease

363 norvegica Gunner

Allen, J. A.

25 glabella Pursh
76 incana L., var. confusa (Ehrh.) Liljebl.

Bell, Robert

2027 rupestris R. Br.

Bishop, Harlow

324 nivalis Liljebl.
325 glabella Pursh
326 glabella Pursh
327 incana L.

Blake, S. F.

5590 incana L., var. confusa (Ehrh.) Liljebl.

Bowdoin College Expedition, 1891.

269 incana L.

Butters & Buell

367 arabisans Michx.

Butters & Holway

40 aurea M. Vahl

Campbell, Robert

66,722 glabella Pursh

Collins & Fernald

88 incana L.
89 incana L., var. confusa (Ehrh.) Liljebl.
90 lanceolata Royle
91 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
94 pycnosperma Fern. & Knowlt.

Cooper, W. S.

40 arabisans Michx. and arabisans, var. canadensis (Brunet) Fern. & Knowlt.
112 incana L.

Delabarre, E. B.

93 aurea M. Vahl

Dodge, Griscom & Pease

25,773 clivicola Fernald

Dodge & Pease

25,787 nivalis Liljebl.
26,130 clivicola Fernald

Eames, A. J.

12,081 arabisans Michx.

Eggleston, W. W.

132 arabisans Michx.

Ehlers, J. H.

1103 arabisans Michx.
1352 arabisans Michx.

Erdmann

63 aurea M. Vahl

Erlanson, C. & E.

648 arabisans Michx.

Fassett, N. C.

15,566 lanceolata Royle

Fernald, Bartram, Long & St. John

7503 incana L., var. confusa (Ehrh.) Liljebl.
7504 incana L., var. confusa (Ehrh.) Liljebl.

Fernald & Collins

92 arabisans Michx.
93 arabisans Michx.
226 Allenii Fernald
577 minganensis (Victorin) Fernald
578 minganensis (Victorin) Fernald
579 minganensis (Victorin) Fernald
580 glabella Pursh, var megasperma (Fern. & Knowlt.) Fernald
581 Allenii Fernald
582 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
583 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
1064 minganensis (Victorin) Fernald
1065 minganensis (Victorin) Fernald
1066 arabisans Michx.
1067 arabisans Michx.

1068 arabisans Michx.
1069 arabisans Michx.
1070 arabisans Michx.
1071 pycnosperma Fernald & Knowlton
1072 pycnosperma Fernald & Knowlton
1073 pycnosperma Fernald & Knowlton
1074 pycnosperma Fernald & Knowlton
1076 glabella Pursh
1076a glabella Pursh
1077 lanceolata Royle
1078 lanceolata Royle
1079 lanceolata Royle
1080 incana L., var. confusa (Ehrh.) Lilejbl.
1081 incana L., var. confusa (Ehrh.) Lilejbl.
1082 incana L.
1212 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald

Fernald, Dodge & Smith

25,772 arabisans Michx.

Fernald, Griscom & Gilbert

28,355 laurentiana Fernald
28,372 norvegica Gunner

Fernald, Griscom & Mackenzie

25,781 Allenii Fernald
25,786 nivalis Liljebl.

Fernald, Griscom, Mackenzie, Pease & Smith

25,779 Allenii Fernald
25,782 Allenii Fernald
25,785 nivalis Liljebl.

Fernald, Griscom, Pease & Smith

25,783 Allenii Fernald
25,789 clivicola Fernald

Fernald & Gilbert

28,365 glabella Pursh

Fernald & Long

28,343 nivalis Liljebl.
28,344 nivalis Liljebl.
28,345 nivalis Liljebl.
28,346 nivalis Liljebl.
28,349 incana L., var. confusa (Ehrh.) Liljebl.
28,358 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
28,366 arabisans Michx.
28,367 arabisans Michx.
28,369 pycnosperma Fern. & Knowlt.
28,370 glabella Pursh
28,371 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
28,391 norvegica Gunner
28,396 norvegica Gunner
28,397 norvegica Gunner, var. hebecarpa (Lindbl.) O. E. Schulz
28,398 norvegica Gunner, var. hebecarpa (Lindbl.) O. E. Schulz
28,399 norvegica Gunner, var. pleiophylla Fernald
28,400 norvegica Gunner and var. pleiophylla Fernald
28,401 norvegica Gunner
28,402 norvegica Gunner
28,403 glabella Pursh
28,407 norvegica Gunner, var. pleiophylla Fernald
28,408 norvegica Gunner
28,408a norvegica Gunner, var. pleiophylla Fernald
28,409 norvegica Gunner
28,410 norvegica Gunner

Fernald, Long & Dunbar

26,703 norvegica Gunner
26,704 norvegica Gunner
26,705 norvegica Gunner, var. pleiophylla Fernald
26,706 incana L., var. confusa (Ehrh.) Lijebl.
26,707 incana L., var. confusa (Ehrh.) Lijebl.
26,708 incana L., var. confusa (Ehrh.) Lijebl.
26,709 incana L., var. confusa (Ehrh.) Lijebl.
26,710 norvegica Gunner
26,711 norvegica Gunner
26,712 norvegica Gunner and var. hebecarpa (Lindbl.) O. E. Schulz
26,713 laurentiana Fernald
26,714 laurentiana Fernald
26,715 incana L., var. confusa (Ehrh.) Liljebl.

Fernald, Long & Fogg

281 norvegica Gunner
1729 incana L., var. confusa (Ehrh.) Liljebl.

DRABA ARABISANS: FIG. 1, portion of fruiting branch, × 1, of short-fruited plant (isotype of *D. megasperma*, var. *leiocarpa* O. E. Schulz) from Bic, Quebec; FIG. 2, short fruiting raceme, × 1, from Percé, Quebec; FIG. 4, small plant, × 1, approaching var. CANADENSIS, from Newfoundland; FIG. 5, silique, × 10, from FIG. 1.

DRABA ARABISANS, var. CANADENSIS: FIG. 3, fruiting raceme, × 1 of isotype from Cape Tourmente, Quebec; FIG. 6, silique, × 10, from FIG. 3.

1730 incana L., var. confusa (Ehrh.) Liljebl.
1731 laurentiana Fernald
1732 arabisans Michx.
1733 arabisans Michx.
1735 arabisans Michx.
1736 arabisans Michx.
1737 glabella Pursh
1738 arabisans Michx.
1739 arabisans Michx.
1740 arabisans Michx.
1741 norvegica Gunner
1742 norvegica Gunner, var. hebecarpa (Lindbl.) O. E. Schulz
1743 norvegica Gunner
1744 norvegica Gunner, var. hebecarpa (Lindbl.) O. E. Schulz
1745 norvegica Gunner
1746 norvegica Gunner, var pleiophylla Fernald
1747 norvegica Gunner, var. pleiophylla Fernald
1748 norvegica Gunner, var. pleiophylla Fernald
1748½ glabella Pursh
1749 arabisans Michx., var canadensis (Brunet) Fern. & Knowlt.
1750 norvegica Gunner, var. pleiophylla Fernald
1751 glabella Pursh
1752 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald

Fernald, Long & Gilbert

28,352 incana L., var. confusa (Ehrh.) Liljebl.

Fernald, Long & St. John

7505 incana L., var. confusa (Ehrh.) Liljebl.

Fernald & Pease

3316 arabisans Michx.
3317 arabisans Michx., var canadensis (Brunet) Fern. & Knowlt.
3318 lanceolata Royle
25,089 incana L.
25,090 arabisans Michx.
25,091 arabisans Michx.
25,092 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
25,093 glabella Pursh
25,094 glabella Pursh and var. orthocarpa (Fern. & Knowlt.) Fern.
25,095 glabella Pursh
25,096 clivicola Fernald
25,097 Allenii Fernald
25,099 nivalis Liljebl.
25,100 nivalis Liljebl.

Fernald & Smith

25,777 clivicola Fernald
25,778 clivicola Fernald
25,780 Allenii Fernald
25,784 Allenii Fernald
25,788 nivalis Liljebl.

Fernald & Weatherby

2447 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
2448 glabella Pursh

Fernald, Weatherby & Stebbins

2446 lanceolata Royle

Fernald & Wiegand

3453 incana L., var. confusa (Ehrh.) Liljebl.
3456 glabella Pursh, var. megosperma (Fern. & Knowlt.) Fernald
3458 glabella Pursh, var. megosperma (Fern. & Knowlt.) Fernald
3460 norvegica Gunner, var. pleiophylla Fernald
3461 norvegica Gunner, var. pleiophylla Fernald
3462 norvegica Gunner, var. pleiophylla Fernald
3463 norvegica Gunner, var. pleiophylla Fernald

Fernald, Wiegand & Bartram

5457 glabella Pursh
5458 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
5458a glabella Pursh
5459 norvegica Gunner

Fernald, Wiegand & Darlington

5460 norvegica Gunner
5461 arabisans Michx.
5462 arabisans Michx.
5463 arabisans Michx.

Fernald, Wiegand & Kittredge

3452 incana L.

3454 incana L., var. confusa (Ehrh.) Liljebl.
3455 rupestris R. Br.
3457 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
3459 arabisans Michx.

Fernald, Wiegand & Long

28,263 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
28,347 nivalis Liljebl.
28,351 incana L., var. confusa (Ehrh.) Liljebl.
28,391 norvegica Gunner
28,405 norvegica Gunner
28,406 norvegica Gunner and glabella Pursh
24,412 norvegica Gunner, var. pleiophylla Fernald
28,413 norvegica Gunner

Fernald, Wiegand, Long, Gilbert & Hotchkiss

28,354 incana L., var. confusa (Ehrh.) Liljebl.
28,356 glabella Pursh
28,392 norvegica Gunner
28,393 norvegica Gunner
28,394 norvegica Gunner, var. pleiophylla Fernald
28,411 norvegica Gunner

Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss

20,380 norvegica Gunner, var. pleiophylla Fernald
28,350 incana L., var. confusa (Ehrh.) Liljebl.
28,374 norvegica Gunner
28,380 norvegica Gunner, var. pleiophylla Fernald
28,382 norvegica Gunner
28,383 norvegica Gunner, var. pleiophylla Fernald
28,384 norvegica Gunner
28,385 norvegica Gunner, var. hebecarpa (Lindbl.) O. E. Schulz
28,386 norvegica Gunner
28,387 norvegica Gunner, var. hebecarpa (Lindbl.) O. E. Schulz
28,388 norvegica Gunner

Gardner, G.

317a glabella Pursh
377 glabella Pursh

Gooding, L. M.

1404 aurea M. Vahl

Griscom, Ludlow

28,364 laurentiana Fernald

Griscom, Mackenzie & Smith

25,770 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald

Griscom & Pease

25,775 clivicola Fernald
25,776 clivicola Fernald

House, H. D.

9436 arabisans Michx.

Johansen, Frits

93,671 incana L., var. confusa (Ehrh.) Liljebl.

Kelsey & Jordan

65 glabella Pursh

Kennedy, R. B.

1 incana L., var. confusa (Ehrh.) Liljebl.
2 incana L., var. confusa (Ehrh.) Liljebl.
3 incana L., var. confusa (Ehrh.) Liljebl.

Low, A. P.

63,140 norvegica Gunner
63,143 glabella Pursh
63,144 glabella Pursh
63,145 aurea M. Vahl
63,146 aurea M. Vahl

McFarlin, J. B.

2174 arabisans Michx.
2246 arabisans Michx.

Mackenzie & Griscom

10,268 arabisans Michx.
10,269 arabisans Michx.
11,079 glabella Pursh
11,089a incana L.

Macoun, J. M.

1920 minganensis (Victorin) Fernald
79,065 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
79,066 glabella Pursh
79,068 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald

79,069 alpina L.
79,070 nemorosa L., var. lejocarpa Liljebl.
79,072 alpina L., var. nana Hook. and fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball

Macoun, John

19 incana L., var. confusa (Ehrh.) Liljebl.
20 arabisans Michx.
178 nemorosa L., var. lejocarpa Liljebl.
477 nemorosa L., var. lejocarpa Liljebl.
2014 nemorosa L., var. lejocarpa Liljebl.
10,276 aurea M. Vahl
18,987 norvegica Gunner

Malte, M. O.

118,919 glabella Pursh, var brachycarpa (Rupr.) Fernald
119,988 alpina L.
120,038 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
120,062 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
120,092 crassifolia Graham
120,098 nivalis Liljebl.
120,136 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
120,136a fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
120,159 nivalis Liljebl.
120,198 glabella Pursh, var. brachycarpa (Rupr.) Fernald
120,203 glabella Pursh
120,209 glabella Pursh
120,243 glabella Pursh, var. brachycarpa (Rupr.) Fernald

Patterson, H. N.

7 aurea M. Vahl

Payson & Payson

5024 aurea M. Vahl

Pease, A. S.

5094 glabella Pursh
5437 pycnosperma Fern. & Knowlt.
5450 pycnosperma Fern & Knowlt.
7350 glabella Pursh
7353 glabella Pursh
7355 arabisans Michx.
7356 arabisans Michx.
7357 glabella Pursh
7358 glabella Pursh
7359 pycnosperma Fern. & Knowlt.
7361 pycnosperma Fern. & Knowlt.
11,981 arabisans Michx.
19,227 glabella Pursh
19,239 pycnosperma Fern. & Knowlt.
20,159 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
20,194 Peasei Fernald
20,205 arabisans Michx.
20,208 arabisans Michx.
20,219 incana L.
20,241 arabisans Michx.
20,242 pycnosperma Fern. & Knowlt.
20,614 lanceolata Royle
23,487 arabisans Michx.
23,633 arabisans Michx.

Pease & Griscom

28,342 nivalis Liljebl.
28,357 laurentiana Fernald
28,377 norvegica Gunner
28,378 norvegica Gunner, var. pleiophylla Fernald
28,379 glabella Pursh

Pease & Long

28,359 laurentiana Fernald
28,360 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
28,390 norvegica Gunner

Pease, Long & Gilbert

28,373 norvegica Gunner

Pease & Smith

25,771 clivicola Fernald
25,774 clivicola Fernald

Perry & Myers

750 aprica Beadle
751 aprica Beadle

Potter, David

546 minganensis (Victorin) Fernald
549 norvegica Gunner
584 incana L., var. confusa (Ehrh.) Liljebl.

Povah, Brown & McFarlin

3671B incana L.

Priest, M. E.

E1 laurentiana Fernald

Rolland-Germain

15,640 arabisans Michx., var. canadensis (Brunet) Fernald & Knowlt.

Rousseau, Jacques

24,831 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
24,833 arabisans Michx.
24,841 arabisans Michx.
26,322 arabisans Michx., var. canadensis (Brunet) Fern. & Knowlt.
26,353 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
26,389 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
26,442 glabella Pursh
26,487 arabisans Michx.
26,503 glabella Pursh
26,508 glabella Pursh
26,548 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
26,582 minganensis (Victorin) Fernald
26,585 lanceolata Royle
26,613 arabisans Michx.
26,695 arabisans Michx.
26,703 arabisans Michx.
31,007 minganensis (Victorin) Fernald
31,072 glabella Pursh
31,150 pycnosperma Fern. & Knowlt.
31,151 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
31,214 incana L.
31,222 incana L.
31,223 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
32,335 arabisans Michx.

Rydberg, P. A.

516 aurea M. Vahl
9666 arabisans Michx.

St. John, Harold

1890 incana L., var. confusa (Ehrh.) Liljebl.
1893 incana L., var. confusa (Ehrh.) Liljebl.
90,475 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
90,476 glabella Pursh
90,477 incana L.
90,478 incana L., var. confusa (Ehrh.) Liljebl.
90,479 incana L., var. confusa (Ehrh.) Liljebl.
90,480 incana L., var. confusa (Ehrh.) Liljebl.
90,481 incana L., var. confusa (Ehrh. Liljebl.
90,482 incana L., var. confusa (Ehrh.) Liljebl.
90,484 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
90,485 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald

Schmitt, C.

289 alpina L.

Sewall, C. S.

40 incana L.
77 (in part) incana L., var. confusa (Ehrh.) Liljebl.
79 incana L.
169 incana L., var. confusa (Ehrh.) Liljebl.
516 nivalis Liljebl.
519 glabella Pursh

Sornborger, J. D.

61 Sornborgeri Fernald
70 incana L.
173 glabella Pursh
175 crassifolia Graham and Sornborgeri Fernald

Spreadborough, W.

16,272 glabella Pursh

Stebbins, G. L., jr.

783 arabisans Michx.

Stebbins et al.

143 lanceolata Royle
144 lanceolata Royle

Stecker, Adolph

212x fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
216 aurea M. Vahl

DRABA LANCEOLATA: FIG. 1, portion of slender fruiting plant, × 1, from Quebec; FIG. 2, portion of slender fruiting plant, × 1, from Ontario; FIG. 3, center of rosette, × 10, from Quebec; FIG. 4, portion of internode, × 10, from Quebec; FIG. 5, silique, × 10, from Vermont.

DRABA LANCEOLATA: FIG. 1, flowering plant, × 1, from Ajan, Siberia; FIG. 2, fruiting plant, × 1, from Songaria; FIG. 3, flowering stem, × 1, from Vermont; FIG. 4, fruiting plant, × 1, from Quebec; FIG. 5, fruiting plant, × 1, from Utah (isotype of *D. valida* Goodding).

Turner, L. M.

4842 glabella Pursh
6316 glabella Pursh

Victorin, Marie-

30 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
573 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
3140 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
3203 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
3867 arabisans Michx.
4128 arabisans Michx.
4134 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
4139 incana L.
9587 glabella Pursh
15,638 arabisans Michx.
15,639 arabisans Michx.
24,839 arabisans Michx.

Victorin, Brunel & Rousseau

17,376 pycnosperma Fernald & Knowlton
17,377 pycnosperma Fernald & Knowlton

Victorin & Rolland

9484 incana L., var. confusa (Ehrh.) Liljebl.
9485 incana L., var. confusa (Ehrh.) Liljebl.
9486 incana L., var. confusa (Ehrh.) Liljebl.
18,244 laurentiana Fernald
18,245 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fern.
18,246 laurentiana Fernald
18,247 incana L., var. confusa (Ehrh.) Liljebl.
18,248 incana L., var. confusa (Ehrh.) Liljebl.
18,249 incana L., var. confusa (Ehrh.) Liljebl.
18,250 incana L., var. confusa (Ehrh.) Liljebl.
18,251 laurentiana Fernald
18,252 laurentiana Fernald
18,253 laurentiana Fernald
18,254 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
18,255 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
18,256 laurentiana Fernald
18,257 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
18,383 glabella Pursh
21,032 incana L.
21,465 incana L., var. confusa (Ehrh.) Liljebl.
21,466 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
21,469 glabella Pursh, var. orthocarpa (Fern. & Knowlt.) Fernald
21,471 glabella Pursh
21,472 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
21,475 incana L., var. confusa (Ehrh.) Liljebl.
21,476 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
21,477 laurentiana Fernald
21,478 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
21,481 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
24,828 minganensis (Victorin) Fernald
24,861 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
24,862 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
24,863 laurentiana Fernald
24,864 incana L.
24,865 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
24,866 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
24,867 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
24,869 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
27,192 incana L.
27,310 incana L.

27,311 incana L.
27,312 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
27,313 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
27,314 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald

Victorin, Rolland, Brunel & Rousseau

17,375 pycnosperma Fernald & Knowlton
17,378 arabisans Michx.
17,379 pycnosperma Fernald & Knowlton
17,380 pycnosperma Fernald & Knowlton
17,381 incana L.
17,382 arabisans Michx.
17,383 arabisans Michx.
17,384 incana L.
17,386 incana L.
17,387 pycnosperma Fernald & Knowlton

Victorin, Rolland & Jacques

33,437 arabisans Michx.
33,586 arabisans Michx.
33,675 nivalis Liljebl.
33,676 glabella Pursh
33,774 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald

Victorin, Rolland & Louis-Marie

21,467 incana L.
21,468 incana L.
21,473 incana L.
21,474 glabella Pursh
21,479 incana L.

Waghorne, A. C.

14 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald
19 glabella Pursh
22 arabisans Michx.
27 norvegica Gunner

Wetmore, R. H.

102,959 incana L.

Wiegand, Gilbert & Hotchkiss

28,353 incana L., var. confusa (Ehrh.) Liljebl.
28,368 arabisans Michx.
28,375 norvegica Gunner
28,376 norvegica Gunner
28,389 norvegica Gunner
28,395 norvegica Gunner

Wiegand, Griscom & Hotchkiss

28,348 incana L.
28,360 laurentiana Fernald
28,361 glabella Pursh, var. megasperma (Fern. & Knowlt.) Fernald

Wolf & Rothrock

634 aurea M. Vahl

Woodworth, R. H.

239 fladnizensis Wulfen, var. heterotricha (Lindbl.) Ball
240 nivalis Liljebl.
240½ glabella Pursh

EXPLANATION OF PLATES 290–319

PLATE 290. DRABA ALPINA L. FIG. 1, flowering plant, × 1, from Dovre, Norway, July, 1902, *Gustaf Peters;* FIG. 2, small fruiting plant, × 1, from Torne Lappmark, July 21, 1924, *Carl G. Alm;* FIG. 3, portion of rosette, × 10, to show long ciliation, from same collection as FIG. 2; FIG. 4, summit of scape, × 10, from same collection as FIGS. 2 and 3; FIG. 5, fruiting plant, × 1, of var. NANA Hook., from Mansfield Island, Hudson Bay, August 30, 1884, *R. Bell* (isotype of *D. Bellii* Holm); FIG. 6, flowering plant × 1, of var. NANA, from North Star Bay, Thule, northwest Greenland, *W. E. Ekblaw*, no. 411; FIG. 7, leaves, × 10, of no. 411.

PLATE 291. D. FLADNIZENSIS Wulfen, VAR. HETEROTRICHA (Lindblom) Ball. FIG. 1, small plant in flower, × 1, from North Star Bay, northwestern Greenland, *Ekblaw*, no. 421; FIG. 2, fruiting plant, × 1, from East Bay, Ikordlearsuk, Labrador, *Abbe & Odell*, no. 382; FIG. 3, tips of leaves, × 10, from *Ekblaw*, no. 421; FIGS. 4 and 5, valve and septum, × 10, from Torne Lappmark, Sweden, August 27, 1917, *Carl G. Alm.*

PLATE 292. D. ALLENII Fernald, n. sp. FIG. 1, small piece of flowering plant, × 1, from Pease Basin, between Mts. Logan and Pembroke, Matane Co., Quebec, *Fernald et al.*, no. 25,782; FIG. 2, small piece of fruiting plant from Tabletopped Mountain, Gaspé Co., Quebec, August 10, 1881, *J. A. Allen;* FIG. 3, portion of rosette, × 10, from Fernald Pass, Mt. Mattaouisse, Quebec, *Fernald et al.*, no. 25,779 (TYPE of species); FIG. 4, flowers from no. 25,782; FIGS. 5 and 6, valve and septum, with seeds, × 10, from FIG. 2.

PLATE 293. D. RUPESTRIS R. Br. FIG. 1, small flowering plant, × 1, from the type locality, Ben Lawers, Scotland, *Arnott;* FIG. 2, fruiting plant from Pointe Riche, Newfoundland, *Fernald & Wiegand*, no. 3455; FIG. 3, flowering plant from Battle Island, Labrador, August 3, 1913, *W. E. Ekblaw;* FIG. 4, rosette-leaves, × 10, from Pointe Riche, Newfoundland, no. 3455.

PLATE 294. D. CRASSIFOLIA Graham. FIG. 1, three of the original specimens, × 1, from summits of the Rocky Mts., *Drummond;* FIG. 2, two plants, × 1, from Ramah, Labrador, *Sornborger*, no. 175; FIG. 3, fruiting plant, × 1, from Disco, Greenland, June 28, 1924, *M. P. Porsild;* FIG. 4, flowering plant, × 1, from Disco, June 27, 1929, *R. T. Porsild;* FIG. 5, leaf and base of scape, × 10, from Ramah, *Sornborger*, no. 175; FIG. 6, flower, × 10, from Disco, Greenland, June 27, 1929, *R. T. Porsild.*

PLATE 295. D. NIVALIS Liljeblad and D. PEASEI Fernald, n. sp. FIG. 1, flowering plant, × 1, of D. NIVALIS, from North Star Bay, Thule, northwestern Greenland, *Ekblaw*, no. 238; FIG. 2, fruiting plant, × 1 of D. NIVALIS from Hayes Harbor, near Etah, Greenland, *Ekblaw*, no. 239; FIG. 3, rosette-leaves, × 10, of D. NIVALIS from Little Quirpon, Newfoundland, *Fernald & Long*, no. 28,343; FIG. 4, type of D. PEASEI, × 1, from Cape Rosier, Quebec, *Pease*, no. 20,194; FIG. 5, tips of rosette-leaves of D. PEASEI, × 10, from the TYPE; FIG. 6, valve, × 10, of D. PEASEI, from the TYPE; FIG. 7, septum and seeds, × 10, of D. PEASEI, from the TYPE.

PLATE 296. D. AUREA M. Vahl. FIG. 1, small flowering plant, × 1, from Upernivik Ø, Sandsten, Greenland, 14 Juli 1929, *M. P. & R. T. Porsild;* FIG. 2, fruiting stem, × 1, from same collection as FIG. 1; FIG. 3, large fruiting plant, × 1, from Sheep Mt., Waterton Lake, Alberta, *J. Macoun*, no. 10,276.

PLATE 297. D. MINGANENSIS (Victorin) Fernald, n. sp., and D. LUTEOLA Greene. FIGS. 1, 2 and 3, small flowering plants of D. MINGANENSIS, × 1, from Île Nue, Archipel de Mingan, Quebec, *Victorin & Rolland*, no. 24,828 (ISOTYPES of *D. luteola*, var. *minganensis* Victorin); FIG. 4, flower from ISOTYPE of D. MINGANENSIS, × 10, showing villous sepals; FIG. 5, dwarf (starved) plant of D. MINGANENSIS, × 1, from under Cap Original, Bic, Quebec, *Fernald & Collins*, no. 578; FIG. 6, fruiting plant of D. LUTEOLA, × 1, from near Pagosa Peak, Colorado, *C. F. Baker*, no. 351; FIG. 7, silique, × 10, of no. 351.

PLATE 298. D. MINGANENSIS (Victorin) Fernald, n. sp. FIG. 1, fruiting plant, well developed, × 1, from Cap Enragé, Bic, Quebec, July 8, 1905, *Williams, Collins & Fernald;* FIG. 2, portion of inflorescence, × 10, showing the villous sepals and villous-hirsute ovary, from Cap Enragé, *Fernald & Collins*, no. 1065; FIG. 3, upper half of silique, × 10, from no. 1065.

PLATE 299. D. INCANA L., var. CONFUSA (Ehrh.) Liljeblad, figs. all × 1. FIG. 1, small plant, showing leafy to leafless fruiting stems (2 stems at left = var. *nana* Lindbl.) from Ile Kécarpoui, Archipel de Kécarpoui, Quebec, *St. John*, no. 90,480; FIG. 2, dwarfed xerophytic extreme (isotype of var. *conica*

O. E. Schulz), from Cap Barré, Percé, Quebec, *Collins & Fernald*, no. 89; FIG. 3, plant from moist and fertile habitat, Cow Head, Newfoundland, *Fernald & Wiegand*, no. 3453; FIG. 4, dwarf xerophytic plant, with leafless or few-leaved stems (var. *nana* Lindbl.), from Sandy Cove, Ingornachoix Bay, Newfoundland, *Fernald, Long & Dunbar*, no. 26,709; FIG. 5, slender plant from same station as FIG. 2; FIG. 6, leafy plant (var. *stricta* Hartm.) from Îlets de la Baie à Jean, Quebec, *Victorin & Rolland*, no. 18,249.

PLATE 300. D. SORNBORGERI Fernald, n. sp., and D. CRASSIFOLIA Graham, var. PARRYI (Rydb.) O. E. Schulz. FIG. 1, TYPE, × 1, of D. SORNBORGERI, from Ramah, Labrador, *Sornborger*, no. 61; FIG. 2, flower, × 10, of D. SORNBORGERI, from Ramah, *Sornborger*, no. 175 in part; FIG. 3, valve, × 1, from TYPE of D. SORNBORGERI; FIGS. 4 and 5, plants, × 1, of D. CRASSIFOLIA, var. PARRYI from Gray's Peak and vicinity, Colorado, *Patterson*, no. 6.

PLATE 301. D. NORVEGICA Gunner. FIG. 1, small fruiting plant, × 1, from Aurland, Norway, August 12, 1928, *Johannes Lid;* FIG. 2, dwarf plant in flower, × 1, from Deadman Cove, Newfoundland, *Wiegand, Gilbert & Hotchkiss*, no. 28,376; FIG. 3, small flowering plant, × 1, from Crow's Head, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1743; FIG. 4, fragment of flowering mat (of 20 stems), × 1, from Flower Cove, Newfoundland, *Fernald, Griscom & Gilbert*, no. 28,372; FIG. 5, fragment of fruiting plant, × 1, from Piton Point, Newfoundland, *Wiegand, Gilbert & Hotchkiss*, no. 28,395; FIG. 6, tips of rosette-leaves, × 10, from 28,376.

PLATE 302. D. NORVEGICA Gunner, var. PLEIOPHYLLA Fernald, n. var. FIG. 1, portion of fruiting plant, × 1, from Ha-Ha Mountain, Newfoundland, *Fernald & Long*, no. 28,399; FIG. 2, flowering plant, × 1, from Burnt Cape, Newfoundland, *Fernald et al.*, no. 20,380 (TYPE of the variety); FIG. 3, bases of rosette-leaves and lowest internode, × 10, from Big Brook, Newfoundland, *Fernald & Long*, no. 28,407; FIG. 4, silique, × 10, from no. 28,399.

PLATE 303. D. CLIVICOLA Fernald, n. sp. FIG. 1, flowering plant, × 1, of the TYPE collection, Big Chimney, Mt. Mattaouisse, Quebec, *Dodge, Griscom & Pease*, no. 25,773; FIG. 2, fruiting plant, × 1, of TYPE collection; FIG. 3, portion of internodes, × 10, from Mt. Pembroke, Quebec, *Griscom & Pease*, no. 25,775; FIG. 4, tip of rosette-leaf, × 10, from Fernald Pass, Mt. Mattaouisse, *Fernald & Smith*, no. 25,777; FIG. 5, portion of inflorescence, × 10, from no. 25,775; FIG. 6, valve of ripe silique, × 10, from Mt. Pembroke, *Fernald & Smith*, no. 25,778.

PLATE 304. D. LAURENTIANA Fernald, n. sp. FIG. 1, small flowering plant, × 1, from Flower Cove, Newfoundland, *Fernald, Griscom & Gilbert*, no. 28,355; FIG. 2, portion of flowering plant (divided), × 1, from Îlets Perroquets, Archipel de Mingan, Quebec, *Victorin & Rolland*, no. 18,252; FIG. 3, portion of internode, × 10, from the TYPE, Grassy Island, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1731; FIG. 4, valve of ripe silique, × 10, from the TYPE, no. 1731.

PLATE 305. D. LAURENTIANA Fernald, n. sp. FIG. 1, fruiting stem, × 1, from the TYPE, Grassy Island, St. John Island, Newfoundland, *Fernald, Long & Fogg*, no. 1731; FIG. 2, portion of basal-rosette, × 10, from the TYPE; FIG. 3, flower, × 10, from Flower Cove, Newfoundland, *Fernald, Griscom & Gilbert*, no. 28,355.

PLATE 306. D. PYCNOSPERMA Fernald & Knowlton. FIG. 1, small fruiting plant, × 1, from Île Bonaventure, Gaspé Co., Quebec, *Victorin, Rolland,*

DRABA LANCEOLATA: FIG. 1, low branching plant (type of *D. cana* Rydb.), × 1, from Alberta; FIG. 2, flowering plant, × 1, from eastern Siberia.

Brunel & Rousseau, no. 17,376; FIG. 2, portion of young basal rosette, × 10, from Bonaventure Island, *Fernald & Collins*, no. 1073; FIG. 3, portion of internode, × 10, from Cap Blanc, Percé, Quebec, *Collins & Fernald*, no. 94; FIG. 4, septum and characteristically crowded seeds, × 10, from no. 94; FIG. 5, outer surface of valve, × 10, from no. 94.

PLATE 307. D. GLABELLA Pursh. FIG. 1, flowering plant, × 1, from St. Anthony, Newfoundland, *Abbe & Brooks*, no. 365; FIG. 2, flowering plant, × 1, from Cape Mugford Peninsula, Labrador, *Abbe*, no. 371; FIG. 3, fruiting stems, × 1, from mouth of Frazer River, Labrador, *Bishop*, no. 325 (near Nain, type-region of *D. Henneana* Schlechtend.); FIG. 4, portion of basal rosette, × 10, from New World Island, Newfoundland, *Fernald, Wiegand & Bartram*, no. 5457; FIG. 5, portion of internode, × 10, from Port Manvers, Labrador, *Dutilly & Gardner*, no. 317 a; FIG. 6, upper half of silique, × 10, from *Fernald, Wiegand & Bartram*, no. 5457.

PLATE 308. D. GLABELLA Pursh, all figs. × 1. FIG. 1, one of the 3 identical TYPE plants of D. GLABELLA in Herb. Brit. Mus. (from photograph presented by the Keeper, Mr. J. Ramsbottom); FIG. 2, type of D. HENNEANA Schlechtendal in Herb. Bot. Mus. Berlin-Dahlem (photographed by Dr. L. B. Smith from the original specimen loaned by the Curator, Prof. Johannes Milbraed); FIG. 3, TYPE of D. DAURICA DC. in Herb. DeCandolle (from photograph presented by Dr. Alfred Becherer and Mr. J. Francis Macbride).

PLATE 309. D. GLABELLA Pursh, var. ORTHOCARPA (Fernald & Knowlton) Fernald. FIG. 1, small plant, × 1, of the TYPE collection of *D. arabisans*, var. *orthocarpa* Fernald & Knowlton, from Bic, Quebec, July 15–18, 1904, *Collins & Fernald;* FIG. 2, septum and seeds, × 10, from the TYPE; FIG. 3, valve, × 10, from the TYPE (note the veiny surface as in D. GLABELLA, as contrasted with the essentially veinless silique of D. ARABISANS).

PLATE 310. D. GLABELLA Pursh, var. BRACHYCARPA (Ruprecht) Fernald. FIG. 1, fruiting stems, × 1, from Disco, Greenland, August 12, 1902, *M. P. Porsild;* FIG. 2, flowering plant, × 1, from Godhavn, Greenland, *Simmons*, no. 16; FIG. 3, silique, × 10, from same plant as fig. 2; FIG. 4, septum and seeds, × 10, from fig. 2.

PLATE 311. D. GLABELLA Pursh, var. MEGASPERMA (Fernald & Knowlton) Fernald. FIG. 1, portion of flowering plant from Vieille Romaine, Archipel Ouapitagone, Quebec, *St. John*, no. 90,484; FIG. 2, portion of fruiting plant, × 1, from Île St. Charles, Archipel de Mingan, Quebec, *Victorin & Rolland*, no. 18,254; FIG. 3, portion of fruiting plant, × 1, from Forteau, Labrador, *Fernald & Wiegand*, no. 3457.

PLATE 312. D. GLABELLA Pursh, var. MEGASPERMA (Fernald & Knowlton) Fernald. Figs., × 10, all from the TYPE of *D. megasperma* Fernald & Knowlton: Paspebiac Lighthouse, Quebec, July 26, 1902, *Williams & Fernald.* FIG. 1, portion of basal rosette; FIG. 2, portion of lowest (fractured) internode; FIG. 3, valve of ripe silique; FIG. 4, septum and seeds.

PLATE 313. D. MCCALLAE Rydberg. FIG. 1, one of the two flowering plants, × ½, from valley below Mt. Aylmer, near Banff, Alberta, *McCalla*, no. 2267 (TYPE of species); FIG. 2, fruiting stem, × ½, from Larch Valley, Banff, *N. B. Sanson*, no. 82; FIG. 3, rosette-leaves, × 10, from head of Ptarmigan Valley, Alberta, *S. Brown*, no. 387; FIG. 4, portion of lower internode, × 10, from no. 387; FIG. 5, portion of flower, × 10, from TYPE, to show pilose ovary; FIG. 6, silique, × 10, from *Sanson*, no. 82.

PLATE 314. D. ARABISANS Michx. FIG. 1, portion of flowering branch, × 1, from Jack Fish, Ontario, *Pease & Bean*, no. 23,487; FIG. 2, fruiting branch, × 1, from the type region, Gardiner's Island, Lake Champlain, Vermont, June 17, 1881, *Faxon;* FIG. 3, characteristically forking fruiting branch, × 1, from St. Fabien, Quebec, *Fernald & Collins*, no. 1068; FIG. 4, fruiting raceme, × 1, from the type region, Shelburne Point, Lake Champlain, Vermont, June 25, 1913, *C. H. Knowlton;* FIG. 5, silique, × 10, showing characteristically smooth valve, from the type region, Lake Champlain, Vermont, July 3, 1902, *W. R. Davis;* FIG. 6, small rosette-leaf, × 10, from Hannah's Head, Newfoundland, *Fernald, Long & Fogg*, no. 1733.

PLATE 315. D. ARABISANS Michx. and var. CANADENSIS (Brunet) Fernald & Knowlton. FIG. 1, portion of fruiting branch, × 1, of short-fruited plant of D. ARABISANS, from Bic, Quebec, *Collins & Fernald*, no. 93 (isotype of *D. megasperma*, var. *leiocarpa* O. E. Schulz); FIG. 2, short fruiting raceme of D. ARABISANS, × 1, from Mt. Ste. Anne, Percé, Quebec, *Fernald & Collins*, no. 1070; FIG. 3, fruiting raceme, × 1, of var. CANADENSIS from Cape Tourmente, Quebec, *Brunet* (ISOTYPE of *D. canadensis* Brunet); FIG. 4, portion of plant, × 1, approaching var. CANADENSIS, from Tucker's Head, Newfoundland, *Fernald, Long & Fogg*, no. 1749; FIG. 5, silique, × 10, of *Collins & Fernald*, no. 93 (isotype of *D. megasperma*, var. *leiocarpa*); FIG. 6, silique, × 10, of ISOTYPE of D. CANADENSIS Brunet.

PLATE 316. D. LANCEOLATA Royle. FIG. 1, portion of slender fruiting plant, × 1, from Bic, Quebec, *Fernald & Collins*, no. 1077; FIG. 2, portion of slender fruiting plant, × 1, from Smoky Head, Bruce Co., Ontario, *Stebbins et al.*, no. 143; FIG. 3, center of basal rosette, × 10, from Mt. St. Pierre, Quebec, *Fernald, Weatherby & Stebbins*, no. 2446; FIG. 4, portion of internode, × 10, from Bic, Quebec, *Fernald & Collins*, no. 1077; FIG. 5, silique, × 10, from Willoughby Mt., Vermont, June 25, 1884, *Faxon.*

PLATE 317. D. LANCEOLATA Royle. FIG. 1, flowering plant, × 1, from Ajan, eastern Siberia, *Tiling*, no. 40; FIG. 2, fruiting plant, × 1, from Songaria, *Schrenk;* FIG. 3, flowering stem, × 1, from Willoughby Mt., Vermont, May 22, 1878, *Pringle;* FIG. 4, portion of fruiting plant from Bic, Quebec, *Rousseau*, no. 26,585; FIG. 5, fruiting plant, × 1, from Fish Lake, Uintah Mts., Utah, *Goodding*, no. 1402 (isotype of *D. valida* Goodding).

PLATE 318. D. LANCEOLATA Royle. FIG. 1, type, × 1, of *D. cana* Rydb., from Morley, Alberta, June 12, 1887, *J. Macoun* (herb. N. Y. Bot. Garden); FIG. 2, lax plant, × 1, from eastern Siberia, *Studendorff.*

PLATE 319. D. BRACHYCARPA Nutt. (FIGS. 1–7), D. BRACHYCARPA, var. FASTIGIATA Nutt. (FIGS. 11 and 12) and D. APRICA Beadle (FIGS. 8–10). FIG. 1, subsimple fruiting plant of D. BRACHYCARPA, × 1, from Sullivan Co., Indiana, *Deam*, no. 26,921; FIG. 2, small-flowered, subsimple plant, × 1, from Jackson, Tennessee, *Bain*, no. 389; FIG. 3, large-flowered, subsimple plant, × 1, from Bedford Co., Virginia, *Curtiss*, no. 178; FIG. 4, small branching plant, with large flowers, × 1, from St. Louis, Missouri, *Engelmann;* FIG. 5, small branching and fruiting plant from Knoxville, Tennessee, *Ruth*, no. 349; FIGS 6, silique, × 10, from no. 349; FIG. 7, septum and seeds, × 10, from no. 349; FIG. 8, fruiting plant (divided), × 1, one of the TYPE specimens of D. APRICA (herb. N. Y. Bot. Gard.); FIG. 9, silique, × 10, from the TYPE; FIG. 10, septum and seed, × 10, from the TYPE; FIG. 11, fruiting plant, × 1, one of the two TYPE specimens of D. BRACHYCARPA, var. FASTIGIATA (herb. N. Y. Bot. Gard.); FIG. 12, silique, × 10, from TYPE of var. FASTIGIATA.

DRABA BRACHYCARPA: FIG. 1, fruiting plant, × 1, from Indiana; FIG. 2, small-flowered plant, × 1, from Tennessee; FIG. 3, large-flowered plant, × 1, from Virginia; FIG. 4, large-flowered plant, × 1, from Missouri; FIG. 5, fruiting plant, × 1, from Tennessee; FIG. 6, silique, × 10, from FIG. 5; FIG. 6, septum and seeds, × 10, from FIG. 5.

DRABA BRACHYCARPA, var. FASTIGIATA: FIG 11, TYPE, × 1; FIG. 12, siliques, × 10, of TYPE.

DRABA APRICA: FIG. 8, TYPE, × 1; FIGS. 9 and 10, silique and septum with seed, × 10, from TYPE.